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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

ON THE USE OF LIME AS MANURE.

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[Concluded from page 366.]

Various qualities of lime.

22. It is necessary for the farmer to know the nature of the lime which he uses. It may be pure, or mixed with silex, argil, or magnesia. *Pure lime* is the most economical, the most active, that which can produce the most effect in the least quantity.

Silicious limestone is used in greater quantity. The lime from it receives, as does the foregoing, the name of *hot lime*, and there is little difference in the application, except that more of the latter is wanting.

The *argillaceous lime* is the same as the hydraulic, lime or the *poor lime* of builders. It appears that the first two kinds are more favorable to forming grain, while the latter favors more the growth of straw, grasses, and leguminous crops. It is better for the improvement of the soil, but a heavier dose of it is required.

Magnesian lime acts very powerfully, but exhausts the soil if given in a large dose, or if it is not followed by alimentary manure in abundance. It has exhausted some districts in England, and entire provinces of America,* and it is to this kind that seem due most of the complaints made against lime.

By chemical processes the farmer may make himself sure of the nature of the lime which he uses.

Pure lime is commonly white, and is dissolved without any thing being left, in nitric or muriatic acid.

Silicious lime is often gray, and leaves a sandy residue [after solution,] which is rough to the touch.

Argillaceous lime is obtained from stones which have a clayey odor and appearance: it is commonly yellow—and leaves, after the solution, a residue which is mostly an impalpable powder, [*et qui prend en masse,*] which may be formed into a mass when wet.

Magnesian lime is made from stone commonly colored brown or pale yellow; it forms a white cloud in nitric acid, diluted with water, and used in less quantity than enough for saturation.

*The author has been deceived by exaggerated accounts of injury from liming in America. It is probable that wherever it occurred, it was caused by the usual ignorance of the action of lime: from erroneously considering it as an alimentary, and directly fertilizing manure, and after applying it, wearing out the soil by continued grain crops. Such effects are spoken of by Bordley. ED. FARM. REG.

Of second limings.

23. When the limed field returns to the state in which it was before the operation, when the same weeds re-appear, and the crops lower in product, it is time to renew the application of lime. It may be conceived that the time of the second liming depends on the amount given in the first. When the dressing has been light, it is necessary, as is done by the Flemings and the Manceaux, to recommence entirely, or to the extent of the first dressing: when it has been heavy, the next may be diminished by one-half. Besides, in this matter we should take counsel of the state of the soil, and of experience, because there are some lands which demand, and can use heavier doses of lime than others.

Quantities applied.

24. The quantities of first as of second dressings of lime, vary with the consistence of soils: they ought to be small on light and sandy soils—and may, without ill consequences, be heavy on clay soils.

The dose ought to vary according as the soil is more or less pervious to water, or as drained well or ill by its texture. Small applications to soils from which the superfluous water does not pass easily, are but little felt; but if the dressing is heavy, and the ploughing deep, the lime aids the draining, and adds to the healthy state of the soil. It may be conceived that the quantity of lime ought also to be increased with the annual quantity of rain that falls—because in proportion to that quantity ought the openness of the soil, and its fitness for drainng, to be extended.

Nevertheless, the practices of the departments of the North, and of La Sarthe, seem to indicate the average dressing which suits in general for land: thus the liming of the North, which every ten or twelve years gives to the soil 40 hectolitres of lime to the hectare, or a little more than three hectolitres a year, agrees with that of La Sarthe, which gives eight or ten hectolitres every three years. The first plan gives at one dressing what the other distributes in four: as both make a like average, it may be thence inferred that the earth demands annually three hectolitres of lime to the hectare, [3⅜ bushels to the acre,] to sustain its fecundity. But as neither the soil nor the plants consume all this quantity of lime, it is to be believed, that at the end of a greater or less length of time, the soil will have received enough to have no more need of it for a certain space of time.

Manner of treating limed lands.

25. After having by liming, given the soil a great productive power, having put it in condition to produce the most valuable crops, which are often also the most exhausting, it is necessary to husband these resources—to give manure in return for the products obtained—to employ as litter,

and not as food, the straw, now increased by one-half—to raise grass crops from the soil now fitted to bear them with advantage—in short, to modify the general plan, and the detail of the culture according to the new powers of the soil, the prices of commodities, and to local conveniencies.

However, it is not necessary to hurry the change of the rotation. Such an operation is long, difficult, very expensive, and ought not to be executed but with much deliberation.

Effects of lime on the soil.

26. The effects of lime, although similar to, are not identical with those produced by marl; and the qualities of soils limed, differ in some points from those of natural calcareous soils. The grain from limed land is rounder, firmer, gives less bran, and more flour, than that from marled land: the grain of marled land is more gray, gives more bran, and resembles that made upon clover, though it may be preferable to the latter. The grain of a limed soil is more like that from land improved with drawn ashes. Limed land is less exposed to danger from drought than marled land, on soils naturally calcareous. The crop is not subject to be lodged at flowering time, when the sowing was done in dry earth.

27. In limed earth, weeds and insects disappear. The earth, if too light, acquires stiffness, and is lightened if too clayey. The surface of the argilo-silicious soil, before close and whitish, is made friable, and becomes reddish, as if rotten: it hardens and splits with drought, and is dissolved by the rains which succeed. This spontaneous loosening of the soil facilitates greatly the labor of the cultivator, the movement of the roots of the growing plants, and the reciprocal action of the atmosphere upon the soil, which remains open to its influence.

All these new properties which the limed soil has acquired, doubtless explain in part the fertilizing means which calcareous agents bring to the soil: but we think it is still necessary to seek some of these causes elsewhere.

28. Lime, according to the recent discoveries of German chemists, seizes in the soil the soluble humus or humic acid, takes it from all other bases, and forms a compound but slightly soluble, which appears, under this form, eminently suitable to the wants of plants. But as this compound is not soluble in less than 2000 times its weight of water, while without the lime, the humus is soluble in a volume of water, less by one-half, it would follow that, in consequence of lime, the consumption of this substance, and the productive power of the soil would, in like proportion, be better preserved. Since the products of the soil increase much from the liming, while the humus is economized, since these products borrow very little from the soil, which remains more fertile while thus yielding greater products, it follows that the principal action of the lime consists, at first, in augmenting in the soil, and in the plants, the means of drawing from the atmosphere the vegetable principles which they find there, and next, in aiding, according to the need, the formation, in the soil or the plants, the substances which enter into the composition of plants, and which are not met with ready formed either in the atmosphere or in the soil.

The researches upon these various points are curious, important, interesting to practice as well as to science—and will lead us to explain, by means not yet appreciated, the action of lime upon vegetation.

Absorption by plants of the principles of the atmosphere, in the vegetation on uncultivated soils.

29. Saussure has concluded, from his experiments, that plants derive from the soil about one-twentieth of their substance; and the experiments of Van Helmont and of Boyle have proved that considerable vegetable products diminish very little the mass of the soil. But this fact is still better proved by the observation of what passes in uncultivated soils.

Woodland that is cut over in regular succession [*taillis*] produces almost indefinitely, without being exhausted, and even becoming richer, the mass of vegetable products which man gathers and removes, and of which the soil does not contain the principles. If, instead of woodland thus partially and successively cut over, we consider upon the same soil a succession of forests, and, for greater ease of estimation, resinous forests, we find, for the products of the generation of an age, forty to fifty thousand cubic feet to the hectare. This product is less than that of the resinous forests of many parts of the country, and yet it is nearly equal in bulk to half of the layer of the productive soil itself: it represents an annual increase of 24,000 weight of wood to the hectare—and which is produced not only without impoverishing, but even while enriching the soil, by an enormous quantity of the droppings and remains of all kinds.

These products which do not come from the soil, are then drawn from the atmosphere, in which plants gather them by means of particular organs designed for that use. These organs are the myriads of leaves which large vegetables bear—aerial roots, which gather these principles either ready formed in the air, or which take up there the elements, to combine them by means of vegetable power. But these aerial roots exert quite a different and superior energy in gathering the constituent principles of plants in the atmosphere, to that of the roots in the ground—since the former furnish nearly the whole amount of the vegetable mass, while the latter draw but very little from the soil.

30. Plants may well find in the atmosphere the greater part of the *volatile* principles which compose them—the carbon, hydrogen, oxygen, and azote. But it is not so easily seen whence they obtain the *fixed* principles of which their ashes are composed. These products could not exist ready formed in the soil—for the saline principles contained in the ashes of a generation of great trees, which would amount to more than 25,000 weight to the hectare, would have rendered the soil absolutely barren, since, according to the experiments of M. Lecoq of Clermont, the twentieth part of this quantity is enough to make a soil steril. We would find a similar result in accumulating the successive products of an acre of good meadow. It is then completely proved that the saline principles of plants do not exist ready formed in the soil. They are no more formed in the atmosphere, or the analyses of chemists would have found them there. However, as the

intimate composition of these substances is not yet perfectly known, their elements may exist in the atmosphere, or even in the soil, among the substances which compose them.

Neither can it be said that these salts may be derived from the atomic dust which floats in the air; for this dust is composed of fragments organic and inorganic, carried especially to the plants themselves, and then, in estimating this atomic matter at the most, we will scarcely find in it the hundredth part of the saline substances contained in the vegetable mass produced. We ought then to conclude that the saline substances of plants are formed by the powers of vegetation, or of the soil.

31. In like manner as with the saline principles, the lime and the phosphates of ashes ought to be due to the same forces, whether that the roots take up their unperceived elements in the soil, or that the leaves gather them in the atmosphere. This consequence results evidently from this fact —that plants grown in soils, of which the analysis shows neither lime nor phosphate, contain them notwithstanding in large proportion in their fixed principles—of which [or of the ashes] they often compose half the mass.*

Absorption of plants, in vegetation on cultivated soils.

32. Vegetation on uncultivated soils operates under conditions altogether different from those of the cultivated, so that the results receive modifications which it is important to examine.

Nature produces, and continues to produce, all the vegetable mass in spontaneous growth, without any other condition than the alternation and succession of the species. In vegetation on cultivated land, by bringing together the same individual plants which are to grow abundantly on a soil and in a climate which, in most cases, are not those which nature had designed, there are required, besides the general condition of alternation of the species, frequent tillage of the soil, and means to repair its losses, that the culture may be productive, and be continued. However, with these new conditions, the force of absorption of plants on the atmosphere still furnishes the greater part of the vegetable principles in soils not limed—and still more in limed soils.

To form a precise idea, we will take it in the land of the writer, its culture and its biennial rotation. As the same qualities of soil are found elsewhere, as no particular circumstance increases or impairs its products, there would be found similar results, for the same qualities of soil, with a different culture. The inferences which we will draw from ours, will apply then to all others.

On our soil of the third class, [or worst quality] fallow returns every two years, with a biennial manuring of 120 quintals to the hectare. This mass contains more than four-fifths of water, which should not be counted as manure, and consequently, the substance which serves for the reparation of the soil is reduced to 24 quintals. We reap, in rye, straw, and buckwheat, after the year of fallow, a dry weight of 40 to 50 quintals on an average. If it is supposed that all the manure is consumed, or employed in forming vegetable substance, still the soil would have furnished 18 to 20 quintals more than it received, and which excess would be due to the power of absorption, whether of the soil, or of the plants, on the atmosphere.

On lands of middle quality, which yield a crop every year, with a double manuring, that is to say, of 48 quintals of dry manure, in two years there is a product in wheat, maize, or potatoes, which amounts to from 12 to 15,000 weight, 120 to 150 quintals, of which two-thirds, or 80 quintals at least are derived from absorption.

On soils of good quality, with a manuring of one-third more than the last, which is equal to 64 quintals of the dry substance to the hectare, there are obtained of dry products, in grain, straw, roots, or hay, double of the last, or nearly so, of which three-fourths, or 180 quintals are due to the power of absorption.

Lastly—upon the most fertile soils, (*sols d'exception,*) where manures are useless, the product, often double, or at least half as much more than the last mentioned, will amount to 360 quintals to the hectare in two years. This product would be, as in spontaneous vegetation, entirely due to absorption.

We would have then, to represent the products of two years, in quintals, in the four classes of soil under consideration, the progressive amounts of 42,130,240,360: or, by deducting from these products the weight of the manure, we would have, to represent the power of absorption, the progression 18, 82, 176, 360 quintals. From this is deduced, as the first conclusion, that, supposing the plants have consumed and annihilated all the substance of the manure given, (which is beyond the truth,) plants receive a much greater part of their substance from the atmosphere, than from the soil; and that this power of drawing food from the atmosphere increases with the goodness of quality in soils.

33. The proportion of fixed substances, or ashes, in agricultural products, is 43 pounds to the 1000, and consequently, in our four classes of land, the quantity amounts to 180, 559, 1032, 1548 pounds. But the soluble saline substances form at least half of these ashes: they are then produced in the two years of the rotation, in the quantities of 90, 279, 516, 774 pounds. But, according to Kirwan, barn yard manure yields 2 per cent. of soluble salts: then the manure given to these soils contained 48, 96, lbs. 128 of saline substances, which being deducted from the preceding quantities, leave the four classes of soils stated, 42,183,388,774 lbs. of products in soluble salts, in two years of the rotation, gained solely by the absorbing forces of the soil and of plants.*

*This fact is explained very differently by the *Essay on Calcareous Manures* (Ch. VII) where it is used to sustain the doctrine of *neutral soils*. Ed.

*The proportions of ashes of different plants, and of their saline matters, vary greatly—and the uniform proportions assumed above, are far from correct, even as averages of unequal proportions. This will sufficiently appear from the following examples extracted from Saussure's table of the products of various vegetable substances. (See Davy's Agr. Chem. Lec. III.)

34. But, in the same soils, with the same manures and the same tillage, by the addition to the thickness of the ploughed layer of only one-thousandth part of lime, the products, whether volatile or fixed, are increased in a striking manner: the soil of the first named (or lowest) quality reaches the product of the second—the second rises one-half or more—and that of the best (of the manured soils) increases a fourth. Thus, our scale of product becomes 130,200,300 quintals—and deducting the manure, 106,152,236 quintals, for the two years of the rotation. The most fertile soil *(sol d'exception)* cannot receive lime beneficially because it contains it already; these lands all belong to alluvions, where the calcareous principle has almost always been found in greater or less proportion.

35. The product of fixed principles [as ashes] in the three classes of limed soils, would be 559,868,1290 pounds, and in soluble salts, 278,430,645 pounds; and deducting the soluble salts of the manure, the quantities would be 230,334,525. A light addition of lime has then doubled the force of absorption, and almost tripled the quantity of saline principles produced. One of the most remarkable effects of lime consists then, in making a soil produce a much greater proportion of saline principles: and if the experiments of M. Lecoq upon the efficacy of saline substances on vegetation are to be admitted, it would be in part to the phenomenon of their production that lime would owe its fertilizing effect.

36. It results from what precedes, that salts are formed in the soil, or in vegetables: thus we see every day the nitrates of potash and of lime form under our eyes in the soil, or elsewhere, without any thing indicating to us the origin of the potash which is contained. But potash itself, again forms spontaneously in drawn ashes, according to the observations of the chemist Gelhen. We see salts also renewed in the artificial nitre beds, with the aid of moisture and exposure to the air. But it is the presence of lime that determines this formation more particularly. The nitrates abound in the ruins of demolished edifices; they are formed in the walls and in all parts of houses situated in damp places; they effloresce on the buildings of chalk in Champagne; they are produced spontaneously in the ploughed lands of the kingdom of Murcia. This effect, which we see that the calcareous principle produces every where, we think it produces in all the soils to which it is given, and where meet the circumstances which favor the formation of nitrates, viz: humidity, vegetable mould, and exposure to the air. But, according to the experiments of M. Lecoq, and others, and the opinion which is established of the old agriculturists, the nitrates are the most fertilizing salts. It would be then to their formation, which it promotes in the soil, that lime owes, in part, its effect on vegetation.

37. The foregoing proofs of the daily formation in the soil, and by vegetable life, of saline and earthy compounds, taken in nature and on a great scale, are doubtless sufficient: but they may still be supported by the experiments and opinions of able men who have adopted the same system.

And first—in the experiment of Van Helmont, in five years, a willow of five pounds grew to weigh 169, and had caused a loss of only two ounces to the soil which bore it. But the 164 pounds which the willow had taken contained five pounds of ashes, which are due entirely to absorption, since the leaves and the other droppings of five years, which were not saved, would have given at least one pound of ashes, which makes up for, besides, all that which, in spite of the sheet of lead which covered the top of the vessel in which the willow grew, it might have received in the waterings, and from other fortuitous circumstances. Boyle has repeated and confirmed this experiment in all its parts.

NAMES OF PLANTS.	Ashes from 1000 parts dry.	Constituents of 100 parts of ashes.					
		Soluble Salts.	Earthy phosphates.	Earthy Carbonates.	Silicia.	Metallic Oxides.	Loss.
Wheat, in flower,	——	43,25	12,75	0,25	32	0,5	12,25
Do. seeds ripe,	——	11	15	0,25	54	1	18,75
Do. seeds ripe,	33	10	11,75	0,25	51	0,75	23
Straw of wheat,	43	22,5	6,2	1	61,5	1	78
Seeds of do.	13	47,16	44,5	——	0,5	0,25	7,6
Bran,	52	4,16	46,5	——	0,5	0,25	8,6
Plants of maize (Indian corn) a month before flowering,	122	69	5,75	0,25	7,5	0,25	17,25
Do. in flower,	81	69	6	0,25	7,5	0,25	17
Do. seeds ripe,	46						
Stalks of do.	84	72,45	5	1	18	0,5	3,05
Spikes (tassels) of do.	16						
Seeds of do.	10	62	36	——	1	0,12	0,88
Oats, (entire plant,)	31	1	24	——	60	0,25	14,75

The proportion of soluble salts, 2 per cent. found by Kirwan in barn yard manure, however correctly ascertained in a particular case, can no more be relied on as a fixed and uniform proportion, or even a true general average, as used by M. Puvis in the estimates above. Ed. Farm. Reg.

Lampadius, in different isolated compartments, some filled with alumine, others with silex, others with [carbonate of] lime, all pure, has made to grow plants, of which the burning has yielded to analysis like results, and which, consequently, contained earths which were not in the soils which bore them.

Saussure, in establishing that plants do not take in the soil more than a twentieth of their substance, in extract of mould and in carbonic acid, has necessarily established, by the same means, that almost the whole amount of fixed principles do not proceed from the soil.

Braconnot has analyzed lichens, which contained more than half their weight of oxalate of lime —and he has observed others covered with crusts of carbonate of lime, when there was none of this earth in the neighborhood.

Shrader, in burning plants grown in substances which did not contain any earthy principle, has found in their ashes, earths and salts which were neither in the seeds sown, nor in the pulverized matters in which the plants grew.

Lastly—the analyses of Saussure, though showing more of the carbonate of lime in the ashes of plants which grew on calcareous soils, than on soils not calcareous, yet nevertheless, they have formed more than a sixth of the ashes from vegetables on silicious soil—and Einhoff has found 65 per cent. of lime in the ashes of pines grown on silicious soil.* The labors of science then confirm what we have above established, that plants, or the soil, form salts and earths.†

38. The fertilizing effect of fallow, of ploughing, of moving and working the soil, prove still more that all these circumstances determine the formation of fertilizing principles, and probably of saline principles, in all the parts of the soil which receive the atmospheric influences.

But salts are also formed in plants. The nitrate of potash, which takes the place of sugar in the beet—the oxalate of potash, so abundant in sorrel —the carbonate of potash in fern, in the tops of potatoes, and in almost all vegetables in the first period of their life—the sulphate of potash in tobacco—the nitrate of potash in turnsole and in pellitory—prove, without reply, that vegetation forms salts, as it forms the proper juices of plants, since the soil contains the one kind no more than the other. But can we say where plants take the elements necessary for all these formations? They can take them only in the soil by means of their roots, or in the atmosphere—in the soil, which would itself take them in the atmosphere, in proportion to the consumption of plants—or directly in the atmosphere by means of their leaves which would there gather these elements. And if the analyses of the soils, and of the atmosphere, show almost none of these elements, it would be necessary to conclude from it, that the substances which analysis has found there, are themselves, or would furnish, if decomposed, the elements of the saline substances, although science may not yet have taught us the means of reaching that end.

39. The formation of lime, like that of the saline principles necessary to plants, is an operation which employs all the forces of vegetation—and these forces, directed to this formation, have no energy left to give a great developement to plants: but when the vegetable finds the calcareous principles already formed in the soil, it makes use of them, and preserves all its forces to increase its own vigor and size.

It would then result, from all that has been said, that lime modifies the texture of the soil—makes it more friable—invigorates it—renders it more permeable—gives it the power to better resist moisture as well as dryness—that it produces in the soil the humate of lime which encloses a powerful means of fertility—that lime increases much the energy of the soil and of plants to draw from the atmosphere the volatile substances of which plants are composed, oxygen, hydrogen, carbon

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*It is presumed, from the context, that these silicious soils, were not the least calcareous. Ed. Farm. Reg.

† Van Helmont's experiment, cited first in the list above, like M. Puvis' reasoning in general, furnishes ample proof that most of the volatile parts of vegetables, and the greater part of their bulk, are drawn from the atmosphere—and they are equally defective in proving that *earths* and other fixed principles are thence derived, or are formed by the power of vegetable life. Distilled water is not entirely free from earthy matter, and if it had been used for watering the willow, it would in five years have given some considerable part of the five pounds of solid matter in the ashes. But as we are not told that it was either distilled or rain water, it may be inferred that the comparatively impure water of a fountain or stream, was used for watering the plant, and which would more than suffice in so long a time, to convey the whole increase of earthy and saline matter. The experiments of Lampadius and Shrader are liable to the same objection—and the former to this in addition—that his earths were deemed absolutely pure, when, in all probability, they were not so—and that a very slight admixture of other kinds with each, would furnish the minute quantity that a small plant could take up during its short and feeble existence under the circumstances stated. The results stated of the experiments of Braconnot, Saussure and Einhoff, may be, and probably are, entirely correct—but they are fully explained by the doctrine of *neutral soils*, and need no support from, and give none to our author's doctrine of the formation of lime by vegetable power.

But though deeming Mr. Puvis altogether wrong in this, his main and most labored position, and that the proofs cited above, as well as some others in the preceding section, are of no worth, still these pages which present his theory, contain what is of more value. He places in a strong point of view the important truth that the atmosphere is the great treasury of manure, from which nature doubles and triples the amount of all the small portions given to the earth by the industry of man. The author's scale of actual products from different grades of soil is also interesting. It sustains the position assumed in the *Essay on Calcareous Manures*, that the worst soils are limed (or made calcareous) to most profit—and that alimentary manures, when needed, are most productive on the best soils.—Ed. Farm. Reg.

and azote—that the limed soil, in furnishing to plants the lime which they need, relieves the soil and plants from employing their powers to produce it—and finally, that lime promotes the formation of fixed substances, earthy or saline, necessary to vegetables. All this whole of reciprocal action and reaction of lime; on the soil, plants and atmosphere, explains in a plausible manner, its fertilizing properties. We would, consequently, have nearly arrived at the resolving of an important agricultural problem, upon which were accumulated all these doubts.

The amount of lime taken up by vegetation.

40. The ashes of plants from calcareous soils, or those which have been made so by manures, contain 30 per cent. of the carbonate and phosphate of lime, which, by taking off the crop, is lost to the soil. But the product of limed land of middle quality, is during the two years of the course of crops, about 20,000 lbs. of dry products to the hectare, which contain a little less than a hectolitre of lime in the calcareous compounds of the ashes. The vegetation has then used half an hectolitre a year. But we have shown that there was necessary, on an average, three hectolitres per hectare, each year. Vegetation then does not take up, in nature, but a sixth of the lime which is given profitably to the soil: the other five-sixths are lost, are carried away by the water, descend to the lower beds of earth, are combined, or serve to form other compounds, perhaps even the saline compounds, of which we have seen that lime so powerfully favors the formation. Another portion also, without doubt, remains in the soil, and serves to form this reserve, which in the end, dispenses, for many years, with the repetition of liming.

Of the exhaustion of the soil by liming.

41. "Lime," it is said, "only enriches the old men: or it enriches fathers, and ruins sons." This is indeed what experience proves, when, on light soils, limed heavily, or without composts coming between, successive grain crops have been made without rest, without alternations of grass crops, or without giving to the soil alimentary manures in suitable proportion. It is also what has happened when magnesia, mixed with lime, has carried to the soil its exhausting stimulus. But when lime has been used in moderation—when, without over-burdening the land with exhausting crops, they have been alternated with green crops—and that manure has been given in proportion to the products taken off—the prudent cultivator then sees continue the new fecundity which the lime has brought, without the soil showing any sign of exhaustion. No where has there been complaint made of argillaceous soils being damaged by lime; and the productiveness of light soils is sustained, in every case that the lime was used in compost.

In America, where the lime of oyster-shells has taken the place of that of magnesian limestone, the complaints of the exhausting effects of lime have ceased.

*Healthiness given to the soil and to the country by calcareous agents.**

42. The unhealthiness of a country is not caused by the accumulation of water, nor from soil being covered by water. Places on the borders of water do not become sickly but when the water has quitted some part of the surface which it previously overflowed, and the summer's sun heats the uncovered soil, and causes the decomposition of the remains of all kinds of matter left by the water, and contained in the upper layers of the soil. Thus, ponds are not unhealthy but when drought, by lowering the waters, leaves naked extensive margins, to be acted on by the sun and air. In rainy years, fevers on the borders of ponds are rare.

Epidemic diseases most often arise on the borders of marshes laid dry—in the neighborhood of mud thrown out of ditches or pits—and in the course of bringing new land into cultivation, where the ploughed soil is for the first time exposed to the summer's sun. In the interior of Rome, the vineyards, the gardens are remarkably unhealthy—while the sickliness disappears where the emanations from the soil are prevented by buildings. In the Pontine marshes, they cover the dried parts with water to arrest the danger of their effluvia. It is then from the soil, and not from the waters at its surface, that insalubrious emanations proceed. Waters placed on the surface, always in motion, agitated by every wind, are not altered in quality, and do not become unhealthy: but whenever they are contained in some place without power to receive exterior influences, or to have motion, they are altered in their odor, taste, and consequently injured in relation to health.

Whenever water then, without covering the soil, penetrates the upper layer without being able to run through the subsoil, it remains without motion, and stagnant, within the soil—is changed by the summer's sun, serves to hasten the putrefaction of the broken down vegetable remains in or on the mould, and the exhalations from the ground become unhealthy. Thus are all drained marshes, of which the surface only is dry, while the water still penetrates the subsoil—thus, all the margins of rivers which have been covered by recent inundations of summer, are unhealthy: thus also, (for a great and unhappy example) the argilo-silicious plateaux, whenever the closeness of the subsoil does not let the water pass through, produce, in dry years, at the close of summer, emanations which attack the health of the inhabitants.

43. But this unhappy effect appears almost no where in calcareous regions: the margins of lakes

*There was no position in the *Essay on Calcareous Manures* which its author assumed with so much hesitation as the agency of those manures in removing causes of disease. That hesitation did not arise from doubt of the truth of the position—but because of its very high importance, and its entire novelty—its being then sustained but by few known facts furnishing direct evidence, and by no known authority whatever of earlier writers. It is therefore the more gratifying to find in the work now presented, that about the same time, another and far remote investigator of the same subject, by a different course of reasoning, and by different proofs, had arrived at precisely the same conclusion—and that he maintains even more generally than the former work, the important and sure effects of calcareous manures in rendering a country more healthy. Ed. Farm. Reg.

and ponds there situated do not produce the same unhealthiness, and even the marshy grounds there are less unhealthy.

The waters which spring out of, or run over calcareous beds, are always healthy to drink. The borers of Artesian wells are anxious that the water which they obtain, to be good, may come out of the calcareous strata which they go through. When the waters which hold carbonate of lime in solution in carbonic acid* run over the surface, they give health to the meadows, in changing the nature and quantity of the products.

Linnæus thought that the unhealthiness of most countries depended on the nature of the water, and was owing to the argillaceous particles which they contain; now these argillaceous particles are always precipitated by the calcareous compounds. For this reason, the waters which stand upon, or run over marl, or calcareous rock, are almost always limpid and clear, because the argillaceous particles have been precipitated by the effect of the solution in the water of the calcareous principle, which is itself dissolved by an excess of carbonic acid.

We are not far from believing then, that throwing rich marl, or limestone, into a well of muddy and brackish water, might have the effect, in part at least, of clearing it, and making it healthy to drink. This remedy, if it should not be as useful as we think, at least could not produce any injury.

Lime, in all its combinations, destroys the miasmata dangerous to life. Its chloride annihilates all bad odors, arrests putrefaction, and in short, has subjected the plague of Egypt to the skill and courage of Pariset. The white wash of lime upon infected buildings, upon the walls and mangers of stables, is regarded as serving to destroy the contagious miasmata of epidemic and epizootic diseases.

Lime destroys the plants of humid and marshy soils, and makes spring those suitable to better soils: then its effect is to give healthiness or vigor to the soil, to dry it, and make it more mellow and permeable. The water then is no longer without motion, and altered consequently in its condition. The limed soil then, to the depth it is ploughed, ought to change the nature of its emanations, as well as its products: and if the lower strata or subsoil, send up emanations, these effluvia in passing through the improved layers of soil, where the calcareous agent is always at work, and developing all its affinities, ought also to be modified, and take the character of those of the upper bed. The limed soil then, it would seem, ought to be made healthy.

But what we maintain here by induction, by reasoning, is fortunately a fact of extensive experience. Among all the countries in which lime has carried and established fertility, there is not cited, that I know of, a single one where intermittent fevers prevail—while that they have not disappeared in the country even where an active culture draws good products from the impermeable argilo-silicious soil.

44. To extend the great benefit of healthiness to the whole of a country, it is no doubt necessary that the whole country should receive the health-giving agent. However, on every farm, in proportion as liming is extended over its surface, the chances of disease will be seen to diminish—and the healthiness of the country will keep pace with the progress of its fertility.

Result of the use of improving manures on the soil of France in general.

Three-fourths of the whole territory of France, to be rendered fruitful, have need of calcareous agents. If the third of this extent has already received them, (which we believe is above the truth,) upon the other two-thirds, or the half of the whole, the agricultural products, by this operation, would be increased by one-half or more, or one-fifth of the total amount. But agriculture, in enriching itself will increase its power, its capital and its population, and will naturally carry its exuberant forces, its energy and activity to operate on the greater part of the 7,000,000 of hectares of land now [*en friche*] untilled, waste, and without product. By bringing these lands into cultivation and fertilizing them by liming or by paring and burning the surface, they would be made to yield, at least, one-sixth of the total product. The gross product of the French soil, then increased by a third or more, might give employment and sustenance to a population also one-third greater than France now possesses; and this revolution due successively to the tillage of the soil, to annual improvements keeping pace with the progressive increase of crops, would be insensible. The state would grow in force, in vigor, in wealth, in an active and moral population, which would be devoted to peace, and to the country, because it would belong to this new and meliorated soil. And this great result would be owing simply to applying calcareous manures to the extent of the soils of France which require them!

46. Upon our extent of 54,000,000 of hectares, our population increased to 44,000,000, would have for each, one hectare and a quarter, and would be less confined than the 24,000,000 of inhabitants of the English soil, who have only one hectare to the head; and yet our soil is at least as good, and it is more favored by climate. And then our neighbors consume in their food, at least a fourth or fifth of meat, while only one-fifteenth of the food of our population consists of meat; and as there is required twelve or fifteen times the space to produce meat as bread, it follows, that twice the extent of soil is necessary to support an Englishman as a Frenchman. Hence it results, that with an increase of one-third, our population would still have a large surplus product which would not exist in England, with an equal increase of population and equal increase of products of agriculture.

But this prosperity of the country, (yet far distant, but towards which however, we will be advanced daily—) would be still much less than in the department of the North, where a hectare nearly supports two inhabitants. And yet they have more than a sixth of their soil in woods, marshes, or unproductive lands: they have be-

*As in limestone water, lime with the greatest proportion with which it can combine of carbonic acid, (forming super-carbonate of lime,) is soluble in water. The excess of acid is lost by heat, by exposure to air, &c. and then the lime is in the form of carbonate—and being insoluble in water, falls separate to the bottom. Ed. Far. Reg.

sides, another sixth, and of their best ground, in crops of commerce, which consume a great part of their manure, and which are exported almost entirely. This prodigious result is, without doubt, owing in part to a greater extent of good soil than is found elsewhere; but it is principally owing there, as well as in England, to the regular use of calcareous manures. As we have seen, more than two-thirds of this country [the North] belongs to the class of soils not calcareous, to the argilo-silicious plateaux, and makes use of lime, marl, or ashes of all kinds.

47. After this great result of increased productiveness, that upon health, although applied to the least extents of surface, would be most precious. Upon one-sixth of our country the population is sickly, subject to intermittent and often fatal fevers, and the deaths exceed in number the births. Well! upon this soil without marshes, calcareous manures would bring a growing population, more numerous than that of our now healthy parts of the country—and as labor would offer itself from every side, these regions, made healthy, would soon be those where the people would be most happy, the richest, and the most rapidly increasing in numbers.

48. If we are not under an illusion, the calcareous principle and its properties upon the soil, form the great compensation accorded by the Supreme Author to man, in condemning him to till the earth. Three-fourths of our soil seem not to produce, except by force of pain and labor, the vegetables absolutely necessary for man. On all sides, and often beneath this surface so little favored, is found placed the substance necessary to the soil, to render it as fertile as the best ground, to enable the cultivator to use for his profit the vegetable mould which it contains and has been accumulating for ages—and to cause the entire soil to be covered by a population active, moral, and well employed. And this precious condiment, this active principle of vegetation, is only needed to be applied in small proportions, to obtain products of which the first harvest often compensates for all the labor and expense. And to complete the benefit, insalubrity, which afflicts the infertile soil, disappears; the new population finds there at the same time strength, riches, and health. There, without doubt, is one of the most happy harmonies of the creation, one of the greatest blessings with which the Supreme Author has endowed the laborious man who is devoted to the cultivation of the earth.

INQUIRIES RESPECTING SUMACH.

To the Editor of the Farmers' Register.

Baltimore, Sept. 12, 1835.

Some years since the attention of the agricultural public was invited, in the American Farmer, to the practicability of turning to valuable account, the *sumach*, which grows spontaneously, and in great abundance, in the middle states. What a lovely ornament to our lawns, if planted and cultivated to its attainable size. Its cool delicate green leaf, and the lively contrast of its red berry! If it were only brought from the East Indies at the cost of some guineas a plant! I do not know to what extent that reference to the subject attracted the notice of the people of Maryland, where the plant is to be seen on every road side; but passing lately through that picturesque and delightful region of your state from Warrenton to Charlottesville, I observed quantities of the plant in a course of preparation for market, and the driver of the stage assured me that many poor people made three or four dollars a day by gathering and curing it.* I could not learn from him precisely what parts of the plant, whether leaves only, or leaves and stems, were gathered, nor how long it takes to cure them, nor how they were put up for, and sold in market, so I determined to ask you to look into the subject, if you should deem it of sufficient importance, and to give some practical hints for those who would avail themselves of an article which requires no labor of cultivation, and which by those who may deem it of insignificant value, will not be denied to the hands of those whose circumstances may lead them to gather it for sale.

In the south, where slave labor is employed, and farms so extensive, the proprietor relies only on a few great staples, whereas, in New England, and among the Dutch, "every little makes a mickle;" so that the northern husbandman, acting on the principle that "take care of the pence, the pounds will take care of themselves," would ask nothing easier than to rear a family and grow rich on the waste lands, and head lands, and the offal of a Virginia estate. Tell us about the sumach.

J. S. S.

[The sumach is used in the process of preparing morocco leather. Our corrospondent will find some account of it at page 152, Vol. I. of the Farmers' Register. We suspect that he heard a greatly exaggerated report of the profits of the gatherers.]

From the Farmer and Gardener.

SHEEP HUSBANDRY.

Mr. Editor—In your valuable "Farmer" for June 2d, I notice a few remarks on "wintering sheep." The importance of this animal as regards flesh, and fleece to our comforts, is prover-

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*In travelling, (through a new district especially,) I make it a point if I can, to get by the side of the driver; and much it is to be desired that our stage coaches were better fitted, as in England, for that indulgence. You have a better view of the country, and few men are to be found in any station so ignorant but that you may entract information or entertainment: and moreover I always find that by *studying and indulging the humor* of the driver, you may always get a mile an hour more out of him. Am I under the blade of the village chronicle, with my life in hands, I always *make him talk*, and learn more of the place and its *characters*, than a fine gentleman would tell you in a week. But compliment on the importance of his vocation—how necessary to the comeliness of the dandy, and to the comfort even of the most slovenly of mankind—praise the light, skilful, and renowned handling of his razor, and with "a marvellous control over facts," he will amuse you with all he knows, and a little more. The most important facts in natural history have been gathered from the unlettered ploughman and the roving hunter. There are in fact few men or books, from which something may not be learned by those who have the philosophy to feel, and the wisdom to acknowledge, that in the midst of light we are yet in darkness. S.

bial, and consequently, merits a full share of attention to its support, as well as propagation.

I have tried some ten or twelve different modes of supporting this animal, in a climate, peculiarly inviting the rearing of sheep. Where it can possibly be had, green rye ought to be secured, to allow them, if but a few mouthfuls per day, particularly at lambing time; but at all times, it appears to be singularly effectual, in preserviug a high state of animal health. A few turnips thrown to them every day is essential to produce the same effect. To these oats may be added, cut just before they are perfectly ripe, and housed, without getting wet. But sir, in the south a much more economical preparation can be readily had—superior in quantity and quality, per acre, to the best clover field. After the oats is taken from the field, turn over the stubble on the cow or tory peas, sow about half a bushel to the acre. In a common season, about the time the peas are ready for curing, by pulling up the vines, and thus saving peas and vines together, it will be found that the *crap grass* will be, not only high enough to cut, but so far in seed, as to furnish a rich hay. Cut then the whole with scythes, and cure as hay, salting well while stacking. Submit this food to the cutting box, feed in troughs, and mix it, half and half, with the oats cut off the ground, the same season, cut up also. Add to this, five turnips per day for each sheep, if the turnips are small, and three if large, or *Ruta Baga*. The fondness of the sheep for the pea, is well known. The strength or nutritive quality of the vine and leaf, when properly saved as fodder, is equally known to southern planters. Salt well, of course, and let tar be in the bottom of the salt trough:—a little pulverized tobacco once a week with the salt, permitting the sheep to ramble through an adjacent woodland, particularly, if hilly, about half the day, in good weather. Sheds for them of course in bad. On trial of this plan it will be acknowledged that the number one acre will support, in high health and fleece, will meet the expectations of the most perfect economist. Like all other animals a state of costiveness is inimical to animal health, but in the sheep, this is readily prevented, by either rye or turnip. The pea agrees well, in every particular with that animal. Rye-straw saved well, and cut before ripe, is superior to oats straw. Barley straw is excellent, and rice straw superior:—and will be found a substitute for the oats, if the turnip is added. A small barley or rye lot, will give the requisite quantity to secure the highest health, of one hundred sheep. Thirty minutes per day, if the turnips are added, will be sufficient. The quantity of green vegetable food, taken in during this short period, with the above quantity of turnips, will secure a healthy fermentation in the stomach of the dry food, secure a high degree of health in the animal, and of course, flesh and fleece. By a little attention to littering with dry litter, on dry ground, a quantity of superior manure may be secured. To save the urine the pen ought to be laid with dry earth, previous to penning, removing it at proper intervals.

AGRICOLA.

Woodlands, Alabama, July 22d, 1835.

From the Farmer and Gardener.

DESTRUCTION OF GARLIC.

Sir—Some time ago, I promised to give you a history of my experience and progress in the extirpation of garlic, which promise I shall now attempt to perform.

The first appearance of garlic on my farm, I think, was between 50 and 60 years ago. My father, who was then living, used every means in his power to eject the unwelcome tenant from the premises, but every effort appeared fruitless; as we occasionally tended the field, it spread still wider and wider. Giving up all hope of subduing it, after taking out a great deal every year, and finding it still continued to enlarge its bounds, we, in order to prevent its taking possession of the whole field, laid off a cut of about six or seven acres in the corner of the field which it occupied, and let it run, as well as I remember, for several years unmolested—stacking the grain—treading it out, and feeding the straw on the foul premises.

After the death of my father, (in 1801,) I adopted the mode of fall ploughing for my spring crops, and without anticipating any beneficial results, farther than that of loosening and pulverizing the ground, I flushed up this foul spot of oats in the spring, rather shallow, (as old fashioned ploughing.) When the oats were, I think, about knee high, a friend walked out with me, to look at them, and to my pleasing astonishment, there were but very few heads of garlic to be seen. I then began to reflect what could be the cause, and remembered that the ground was ploughed up very late in the fall, or early in the winter, and consequently, all the germinating power of the exposed garlic, was killed by the frost, before it had time to dry by the sun or air. I am of opinion that a bunch of garlic might be pulled up in the month of June or July, and laid upon a stump to dry until November, and if then planted, that it would grow again; but let it freeze while the pulp is in it, and its vegetating property will be completely destroyed.

Having thus by mere accident, so nearly gained a victory over my invading enemy, I again commenced the attack by carefully taking it up every spring, and so far succeeded, that about ten or twelve years ago, I had four cradles running in the whole field, including that foul cut, and offered a *fippenny-bit* for every head that the reaper should find, and my leader alone found one.

However, we still continue to look out for it every spring, and sometimes find a few heads, which I think are probably dropt by our horses after being fed abroad with foul oats.

At a farm I lately purchased there was a field very full of garlic; I conceived an additional plan of teazing and making a "demonstration" on the enemy, to wit:—I broke it up of moderate depth about the first of December, and was determined as soon as there came one freezing night upon it, after ploughing and a thaw, to run a sharp toothed harrow over it again, and so alternately after every freezing and thawing spell during the winter, in order to turn it up, and expose it to the frost as often as I could, but the winter was very unfavorable to such an enterprise, being in the forepart covered with snow, and in the latter part,

continually frozen. I did not go over the field myself in the spring; but my manager told me, that there was an abundance of garlic on the top of the ground, as soft as mush, and when cutting the oats at harvest, although there was a considerable quantity which had escaped, my manager says, he is certain there would have been ten times as much had it not been for winter treatment. Having thus given my history on the culture of garlic, if you or any of your readers will in return, instruct me how to repel those *mobs of mischief*, *Carolina pink*, *wild carrots*, and the *blue thistle*, which are now commencing their attacks of violence, your account will stand equally balanced, with that of your friend and humble servant,

THOMAS HILLEN.

Extracts from Ure's Philosophy of Manufactures.

COMPARISON OF STEAM AND HORSE POWER.

The value of steam-impelled labor may be inferred from the following facts, communicated to me by an eminent engineer, educated in the school of Boulton and Watt:—A manufacture in Manchester works a 60-horse Boulton and Watt's steam-engine, at a power of 120 horses during the day, and 60-horse during the night; thus extorting from it and impelling force three times greater than he contracted or paid for. One steam horse-power is equivalent to 33,000 pounds avoirdupois, raised one foot high per minute; but an animal horse-power is equivalent to only 22,000 pounds raised one foot high per minute, or, in other terms, to drag a canal boat 220 feet per minute, with a force of 100 pounds acting on a spring; therefore, a steam-horse power is equivalent in working efficiency to one living horse, and one-half the labor of another. But a horse can work at its full efficiency only eight hours out of twenty-four, whereas a steam-engine needs no period of repose; and, therefore, to make the animal power equal to the physical power, a relay of one and-a-half fresh horses must be found three times in the twenty-four hours, which amounts to four and a half of horses daily. Hence, a common 60-horse steam-engine does the work of four and-a-half times 60-horses, or of 270 horses. But the above 60-horse steam-engine does one-half more work in 24 hours, or that of 405 living horses! The keep of a horse cannot be estimated at less than 1s. 2d. yer day; and, therefore, that of 405 horses would be about £24 daily, or £7,500 sterling, in a year of 313 days. As 80 pounds of coals, or one bushel, will produce steam equivalent to the power of one horse in a steam-engine during eight hours' work, sixty bushels, worth about 30s. at Mancester, will maintain a 60-horse engine in fuel during eight effective hours—and 200 bushels, worth 100s., the above hard-worked engine during twenty-four hours. Hence, the expense per annum is £1,565 sterling, being little more than one-fifth of that of living horses. As to prime cost and superintendence, the animal power would be greatly more expensive than the steam power. There are many engines made by Boulton and Watt, forty years ago, which have continued in constant work all that time with very slight repairs. What a multitude of valuable horses would have been worn out in doing the service of these machines! and what a vast quantity of grain would they have consumed! Had British industry not been aided by Watt's invention, it must have gone on with a retarding pace, in consequence of the increasing cost of locomotive power, and would, long ere now, have experienced, in the price of horses, and scarcity of water-falls, an unsurmountable barrier to further advancement: could horses, even at the low prices to which their rival, steam, has kept them, be employed to drive a cotton-mill at the present day, they would devour all the profits of the manufacturer.

Steam-engines furnish the means not only of their support but of their multiplication. They create a vast demand for fuel; and, while they lend their powerful arms to drain the pits and to raise the coals, they call into employment multitudes of miners, engineers, ship-builders, and sailors, and cause the construction of canals and railways; and, while they enable these rich fields of industry to be cultivated to the utmost, they leave thousands of fine arable fields free for the production of food to man, which must have been otherwise allotted to the food of horses. Steam-engines, moreover, by the cheapness and steadiness of their action, fabricate cheap goods, and procure in their exchange a liberal supply of the necessaries and comforts of life, produced in foreign lands.

THE TOMATO.

Dr. Bennett, the Professor of Midwifery, and the Diseases of Women and Children, Hygeine and Acclimatement, in the Medical College of Lake Erie, which is the Medical Department of the Willoughby University of Lake Erie, at Chagrin, Cuyahoga Co., Ohio, in his public introductory lecture recently delivered in that flourishing institution, made the following statement relative to the *Solanum Lycopersicum*, or as it is generally called, tomato, love apple, Jerusalem apple, &c., to wit:

1st. That it (the tomato,) is one of the most powerful deobstruents of the Materia Medica, and that in all those affections of the liver, and other organs where calomel is indicated, it is probably the most effective and least harmful remedial agent known to the profession.

2d. That a chemical extract will probably soon be obtained from it which will altogether supercede the use of calomel in the cure of disease.

3d. That he has successfully treated serious diarrhœa with this article alone.

4th. That when used as an article of diet, it is almost a sovereign remedy for dyspepsia, or indigestion.

5th. That persons removing from the east, or north, to the west, or south, should by all means make use of it as an aliment, as it would in that event, save them from the danger attendant upon those violent bilious attacks to which almost all unacclimated persons are liable.

6th. That the citizens in general should make use of it, either raw, cooked, or in form of a catsup, with their daily food, as it is the most healthy article of the Materia Alimentaria, &c.

Now if these positions be true, it is of the utmost importance that the public should be made acquainted with the facts, and it is with this view that I now make this communication for the press.

From the last London edition of the "Complete Grazier."

ON THE BREEDING, REARING, AND FATTENING OF SHEEP.

[Continued from p. 355 Vol. III.]

On folding sheep.

With regard to the practice of folding sheep, there is much difference of opinion. The late eminent Mr. Bakewell was decidedly averse to the practice of folding, considering the advantages supposed to be derived from it as visionary; as, in fact, robbing a larger portion of a farm in order to enrich a small part. He was of opinion that the keeping of large flocks together, even of any number exceeding a hundred, is a barbarous practice, as the strongest will always consume the best food, which ought to be appropriated to those which are less hardy; and observed, "that if folding be necessary on farms that have no commons appendant to them, why should there not be different small folds, on different parts of the farm, for animals of various ages, kinds, and strength, and thereby save the trouble of driving them from one part of a farm to another? For, is it not preferable, after the animal has filled its belly, that it should lie down to sleep (and let it not be forgotten, that repose contributes materially to promote fattening) than travel, in order to create an appetite?" From extensive and accurate observations, in various parts of this island, Mr. Bakewell became confirmed in his opinion of the inefficacy of folding, and his example has been followed by many of our most enlightened agriculturists, who have relinquished the practice; for, however beneficial it may be to the folded land, it has been found prejudicial to the sheep, unless when it has been resorted to for the purposes of shelter. Not only, indeed, are those lands, which are in any degree moist, liable to be poached by the treading of the animals, but also these are injured by the wet, and by being driven to and from the fold, are liable to be excessively fatigued; so that the stronger sheep only can feed without receiving much detriment. Besides, young lambs are often seriously injured; the ewes are liable to be hurried and heated; and the weaker animals are thus prevented from feeding at pleasure. There are, however, many light soils which cannot be tilled to advantage without the assistance of the fold, and on these the custom is necessarily continued: but it is only properly applicable to fold flocks and store sheep; for the purposes of folding and fattening are wholly distinct, as are the breeds most appropriate to each. The fold requires a hardy, active animal that can bear fatigue; but that which will stand still and eat, is best adapted for the grazier.

On breeding farms, sheep of different ages are generally kept asunder, unless when the number is so small that they are under the care of only one shepherd; but the idea above suggested, by Bakewell, of keeping all sheep in small flocks, is very important, and it merits attentive consideration. There are, however, numberless down-farms where the fold is so much an object that without it they could not be cultivated, and on these *straggling* folds the practice would evidently be expensive as well as injurious. On such land, many farmers give a very slight dressing, one night in a place, and the fold three square yards per sheep; whereas they ought to be folded two nights in the same spot, and one, or at most two, square yards allotted to each animal; for if arable, the ground should be perfectly black, and if grass, well covered with dung. The common calculation is, that 3000 sheep are sufficient to fold an acre in one night; but it is evident, that the quantity of manure must depend upon that of the food consumed; and its value will be in proportion to the fattening quality of the provender: thus, the dung of sheep fed on oil-cake is of a much more fertilizing nature than that produced by turnips; but the latter afford the largest amount. The kind of sheep must also influence the number to be folded; the larger and coarser-feeding breeds requiring more space and yielding more manure than the small heath species. On the South Downs the calculation is 500 to 28 square perch.

On land that is too wet to carry sheep upon the fallows, all the advantage of the moveable fold in collecting the dung, together with greater advantage to the flock, may be secured by having a *standing fold* on a dry spot in the most convenient part of the farm; or, where the flock is small, or that it is considered material to afford superior shelter, a part of the farm-yard may be fenced in, and provided with sheds open towards the sun, and having pens for receiving the flocks accordingly as they are separated, so that the sheep may be let out to exercise themselves on the land for a few hours in the middle of the day, unless the weather be extremely unfavorable. In this system of *cotting*, the floors of the various sheds ought to be well beaten in, and laid on a slight declivity, for the discharge of the urine, which, as well as the dung, should be frequently removed; for cleanliness is essential to the thriving of these animals. The practice here stated, will, indeed, render an abundant supply of litter necessary, and whether the additional expense thus incurred is compensated by the supply of manure thereby obtained, is worthy of consideration. It appears, from an experiment on record, that 134 sheep, and 30 lambs were penned for six weeks, in a standing fold, and littered with one load of straw, per week, which produced *twenty-eight* large loads of dung. They were fed morning and evening in the fold with drawn turnips, and, during that time, consumed two acres of those roots, thus:—

Valuing dung at 7s. 6d. per load,	£10 10 0
——— straw at 20s. per load,	6 0 0
There will remain	4 10 0
or, per acre for turnips,	£ 2 5 0

There can be no doubt that all animals soiled in yards or stables will produce more manure, in the proportion of the litter, than those which are fed in open fields: and it is also more than probable that a fermented compost, so made, will prove more effectual, when regularly spread over the land in due season, than dung promiscuously dropped at various periods. These observations more especially apply to heavy cattle; which, besides being apt to poach the land, do not distribute their dung so equally as sheep. But, independently of the fact, that the treading of sheep is beneficial to light soils, there are the important considerations of convenience, expense, and comparative profit. With regard to the first, it is not always convenient to spare men and teams for turning, carry-

ing out, and spreading manure: then the expense of all that labor must be deducted from the value of the dung; and lastly, considering that 3000 will fold an acre of land in a night, and regarding the number mentioned in the experiment as equal, with the lambs, to 150 sheep, it follows, that in six weeks they would have folded two acres, *without the straw.* It is unnecessary to pursue the calculation, for it is sufficiently obvious that it turns the scale of profit, *on the mere manure,* in favor of the common fold; but with regard to the more important consideration, the health of the sheep, there can be no doubt that the standing fold is more beneficial in severe weather, and more particularly to fatting stock. On the score of expense it should, however, be remarked, that the litter charged in the experiment is unnecessarily dear. Straw used upon a farm, can only be considered worth twenty shillings a load for the purpose of feeding; and, in this instance, fern, or dried leaves, if procurable, or stubble, would have answered the purpose equally well, while a material difference would have appeared on the account.

The respective advantages, and disadvantages, of these several methods may be thus concisely stated:—

The common *moveable fold* allows the land to be manured without any further cost than the trouble of removing the hurdles: but, being usually placed upon arable land, the dirt is injurious to the fleece; it prevents the sheep from fattening; and the wet retained by the ground is prejudicial to their health.

The *standing fold* admits of the most convenient choice of situation; and, whether littered or not, allows of the dung being accumulated to form a compost, and applied to the land at the most proper season—advantages which the moveable fold does not possess; but it occasions the additional expense of removing the dung, forming the compost, and spreading it on the soil.

The *cote* combines all the advantages, and disadvantages, of the standing fold, with the additional merit of affording superior shelter; but it also occasions the additional expense of the erection of sheds.

As to *housing* sheep in close stables, it is contrary to the nature of the animal, and is a practice by no means to be recommended, except when it may be absolutely necessary to shelter tender ewes from great inclemency of weather at lambing time; and even then, an inclosed yard, or at most, an open shed is preferable. Except in such cases, it may, indeed, be very questionable whether the animal is benefited by any of these methods. Nature has provided it with a covering which effectually secures it against cold and rain, and has evidently adapted different breeds to different climates: the hardy mountain sheep braves every kind of weather, and not only thrives on the most scanty herbage, and in the most exposed situations, but is even found to degenerate on richer soils. It is the introduction of tender breeds on land not adapted to them that has occasioned any necessity for shelter, unless when it may be prudent, on the bleak hills of the north, to guard against the consequences of snow storms; or when, from the absolute failure of field pasture, it may be expedient to pen the sheep for the purpose of more conveniently feeding them.

With respect to the fold, it can only be considered advantageous in so much as regards the land; and notwithstanding the objections already stated, it must be admitted that there are many arable hill-farms which could not be cultivated without such assistance. In such situations, it is sometimes next to impossible to manure the land in any other way; and although, from the injury done to the sheep, and the increased consumption of food—folded sheep, having been ascertained to eat more, and to thrive less, in consequence of additional exercise, than those which lie quiet in their pasture—it has been said, "that folding is gaining one shilling in manure by the loss of two in flesh," yet the expedience of the system is still a mere matter of calculation of the relative profit to be obtained by growing corn or feeding sheep.

[To be continued.]

TREATISE ON IRRIGATION.

Extracted from the Practical Irrigator and Drainer.

By GEORGE STEVENS,

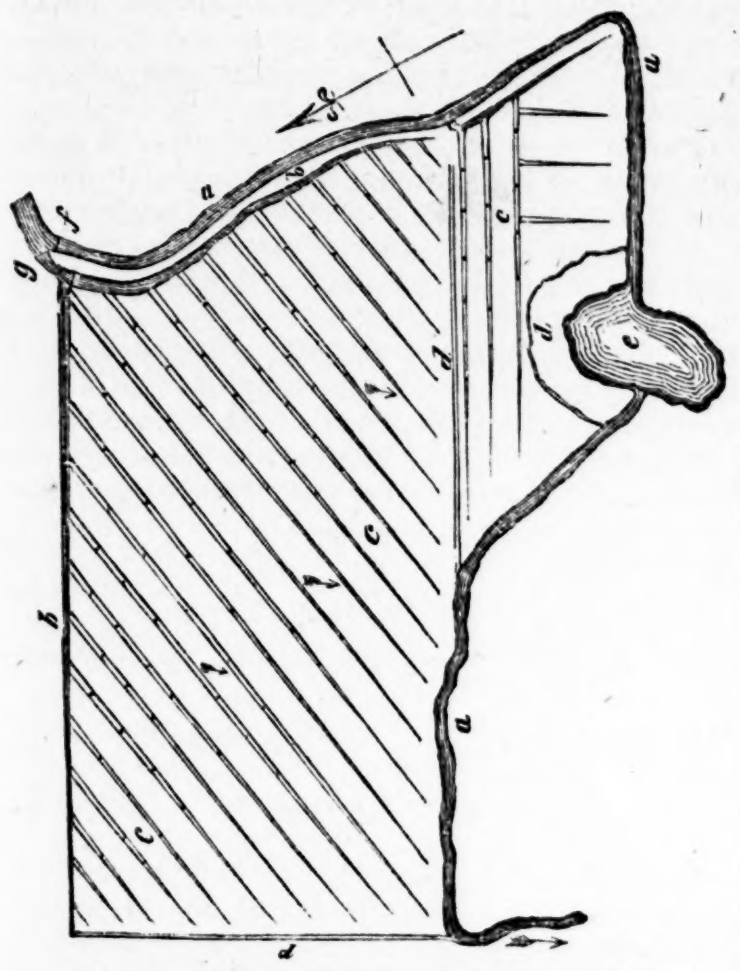
[Continued from p. 351 Vol. III.]

Catch-work irrigation.

This species of irrigation is very different from that which I have described and recommended above, and which ought never to be resorted to when the bed-work plan is practicable. In some situations, however, the declivity of the ground is too great to admit of its being formed into beds, with their respective feeders pointing down the descent; and, therefore, it is requisite to make the feeders at a certain distance below each other, across the declivity, to catch the water, again and again, from the higher to the lower part of the meadow. By this method, it is evident that the contents of the water, thus repeatedly used, are not equally disposed of, for the upper beds must undoubtedly receive a greater part of whatever sediment it deposites. The best method to obviate this inequality of distribution of the sediment, is to continue the conductor down the centre or highest part of the declivity to the last bed, by which means a certain quantity of the first and richest water will be conveyed unused to every bed. In some catch-work irrigation, the only open drain for carrying away the water is at the lower side of the meadow; in others, again, such as the Whitehaugh meadow, belonging to Sir John Hay, and the Townfoot meadow of Dolphington, belonging to Richard Mackenzie, Esq., the surface of the land is so situated, that the system of irrigation is partly bed-work and partly catch-work; for in these, some of the lower parts of the feeders become drains, and in others the upper part of the feeder is a drain, which is necessary in many situations, not only to save an immense expense in levelling, but to make the most of the water. The distance between the feeders in catch-work irrigation depends on the fall of the ground and the quality of the sub-soil. In dry porous sub-soils, with a fall of one foot in twenty or thirty, the width of the beds might be made from fifteen to twenty yards; but when the declivity of the ground is less, and with a wet subsoil, the width of the beds should never exceed ten yards. (See plan 2.)

Catch-work irrigation should never be resorted to unless absolutely necessary. I have seen it

Plan 2.



a, a, Stream—*b, b*, Conductors—*c, c*, Feeders—*d, d*, Drainers —*f, g*, Sluices.

adopted where there was no rapid descent in the land to demand it; I have seen it used, merely because it was less difficult and less expensive in the execution.

In every irrigated meadow, a small side sluice should be placed in the side of the conductor, to let out any waste water that may make its escape through the head sluices; for it is of the greatest consequence that the meadow, between the different intervals of irrigation, be made completely dry, for if the water be allowed to run dribbling the whole season, the consequence will be, that the driest land in a very short period will either be covered with rushes or turned into a perfect bog. It is equally necessary to keep an irrigated meadow dry, as it is to make it wet at proper times.*

In the formation of an irrigated meadow, there are two rules of the greatest weight: one is, that no part of the works be made on a dead level; and the other, that every drop of water be kept in constant motion; but to give exact directions for the formation, is beyond the ingenuity of man, for no two pieces of land are precisely alike, which renders it impossible for the irrigator to follow the same plan in one field that he has done in another. Each meadow, therefore, requires a different design, the construction to be varied according to the nature of the ground, and the quality and quantity of water. Inclined planes are absolutely necessary for the purpose of irrigation; and the benefit of irrigation depends so much upon the good management and patient perseverance of those who have the superintendence of it, that I do not wonder it has so often proved unsuccessful.

However simple the construction of a water meadow may appear to be on a superficial view, those who enter minutely into the detail will find it much more difficult than is commonly imagined. It is not an easy task to give an irregular surface the equal slope requisite for the overflowing of water. It is very necessary for the irrigator to have just ideas of levels; a knowledge of superficial forms will not be sufficient. Few people unacquainted with the art of irrigation, and the regularity of form which the adjustment of water requires, have any idea of the expense of modelling the surface of a field.

Where land is very unlevel, it is sometimes advisable to break it up with the plough, and take a crop of oats, before the formation; by which means the land can be properly cleaned and pulverized before levelling it into form with the levelling plough and spade the following year—an operation which may be executed at half the expense of doing the whole with the spade and wheelbarrow. But there is one advantage by doing the whole work with spade and barrow, especially where the turf is strong, which is, that the water can be applied as soon as the beds are formed; but by breaking up, and taking a crop of oats, it will require two or three years after the grass seeds are sown before the water can be used, which some proprietors think too long to wait, therefore will rather be at an additional expense to have the turf lifted and laid down again; by so doing, the whole operations may be performed in one season. The grass seeds generally used for laying down land for water meadow are, vernal grass, crested dogstail, soft meadow grass, rough-stalked meadow grass, foxtail, fiorin grass, (*agrostis stólonifera*,) which last is one of the prevailing grasses in all good meadows; and the best way of planting it is to cut the whole into short pieces, the same way as cutting straw into chaff, and sow it with other seeds. It is not always that those grasses give a good crop the first year; therefore, to obviate this evil, some perennial ryegrass seed should be sown along with the others, to produce a crop of hay before the watering commence.

Mr. Smith, in his Essay on Irrigation, says, "it is no matter what kind of grass is sown on land prepared for irrigation, for the grasses best adapted for the soil will soon make their appearance and banish all others." This is very true, but it is equally obvious, that if you can replenish the meadow at once with the grasses best adapted to it, by sowing it with their seeds, such practice would be more profitable than to rest satisfied with the slow return of inferior crops to be obtained during the two or three years that the uncongenial grasses are going into decay, whilst the spontaneous and more congenial grasses are but slowly occupying their room. The expense of keeping a water meadow in repair is from 5s. to 6s. per acre per annum. The second year after a water meadow is made is the most expensive, on account of such places as have been forced, to bring the surface of the ground to a level, sinking unequally.

Management.

The adjustment of water flowing over the sur-

* This happened to part of Mr. Campbell's meadow at Kailzie; a few years ago the meadow was formed of a very porous soil, but the water being allowed to run too long, it made the ground boggy, and producing rushes.

face of grass land, for the purpose of improving the herbage, is a very nice operation; it requires a perfect knowledge of levels and the vegetation of grasses, and ought never to be intrusted to an unskilful manager. Where the supply of water is, in every state of the stream that supplies it, sufficient for the whole or one-half of the meadow at once, the management becomes pretty easy; for after the works are cleaned, and the water regulated in the autumn, the sluices should be fixed at such a height as to let in the exact quantity of water required, when it is allowed to run, according to the state of the weather and season of the year, for two, six, ten, or fifteen days, without any alteration; and it will be found (unless the water has carried along with it weeds, sticks, or wreck of any kind) to run during that whole period nearly as equally over the surface as when first put on. But where the stream is small, and rising and falling with every shower of rain, the management becomes so much more difficult, that it will require every possible attention of the irrigator to watch and change the water from one part of the meadow to another, or from one bed to another, according to its abundance or deficiency. Such meadows are indeed generally ill managed, although half an hour's work in a day would put every thing to rights. Indeed, let the formation of the meadow be ever so perfect, and the supply of water constant and uniform, yet it is necessary that the manager should survey the whole every three or four days, to remedy any defect occasioned by the collecting of weeds, &c., or by a stop being washed away, which would prevent the equal distribution of the water, and thereby cause some places to have too much and others too little; so that, in the former case, the grasses might either be killed or very much injured by the generation of scum, or, in the latter, there would be little or no produce of grass.

Small streams are certainly much more at command than large; but if the manager, as is too often the case with a young practitioner, vainly endeavor to water too much ground at a time, he may give one part too much water and another too little; for, on the alteration of the apertures and adjustment of the water, greatly depends not only the quality but quantity of the crop.

One of the greatest defects in the management of irrigated meadows in this country, is the not paying proper attention to freeing the ground from subterraneous and stagnant water; for experience shows that, wherever there is too much moisture beneath the surface, or if the water lodges too long upon it, the crop will always be coarse and scanty. Another great error generally committed is, allowing the water to run too long at a time, without properly drying the ground. I know some instances in this neighborhood, where the ground is not attempted to be dried from the time the water is put on the meadows in the autumn till eight or ten days before the cutting of the hay; the consequence is, that the grass is of the coarsest quality, and the ground has become so very boggy, that the whole crop of grass is obliged to be carried by people to some other place to be made into hay. Another inconvenience arises from bad management, which, I am sorry to say, is too prevalent in this country; that is, permitting the grass to stand too long before cutting; the consequence is, coarse hay, badly made, and, in many instances, half rotten,* before being put into the stack; and, moreover, owing to the lateness of the season, the aftermath is entirely lost; so that the proprietor has not received half the value of his meadow which he ought to have received, if the hay had been made in the proper season. A water meadow, like a garden, will be good for little without due attention. All dry soils require more attention than moist ones; for if the water on moist soils should not be so nicely regulated as on sandy or dry land, the crop of grass will not be so defective as on porous soils, where the management has been neglected. I presume that all dry land that has been converted into water meadows, in countries where the art of irrigation is not well known, and the supply of water not abundant or regular, is liable to more injury, from imperfect treatment, than land of a moist nature, for plants must have their food at stated times as well as animals; but this cannot be the case with the grass of a meadow where the water is irregularly applied. This is undoubtedly the reason why part of the water meadows on the Duke of Buccleuch's estates in the south of Scotland have failed. The most of those meadows were situated on the Esk, Ewes, Yarrow, and Ettrick rivers, and were generally made on alluvial soils that have been formed by the overflowing of the water, so that they were generally porous and dry; and the country, drained by these streams before entering the meadows, being mostly very poor, of course the water could not be very rich, and moreover, in dry seasons, in many cases, must have been very scanty: when we add to the account an improper management, it is impossible that a good crop should be produced. I have never yet seen a watered meadow, let the land and water be ever so poor, if the management has been any way tolerable, but what has paid every expense within three years; and, whatever people may say concerning the failure of his Grace's irrigation, I here venture to assert, that so long as a regular management was carried on, there were no complaints; but as soon as no pains were taken to keep the meadows in proper repair, and grain getting so very dear, the farmers saw the advantage of breaking them up, though I believe many of them have had every reason to repent of their folly. Several irrigated meadows were made in different parts of Scotland, about the same time as the Duke's, on the same kind of soil, with water of a similar quality; but as they have been otherwise managed, the proprietors have no reason to complain, but declare that their irrigated meadows are the most productive part of their estates.

Much has been said on the good and bad qualities of water used in irrigating grass land, and it is the favorite opinion of Mr. Smith and Mr. Davis, that spring water is as efficacious as water flowing through a rich country, or the washings of a large town, for irrigating grass land. I would here recommend to those authors, or any others who are of the same opinion, to inspect the irrigated meadows which are watered by the washings of the city of Edinburgh, where I trust they would find the superiority of muddy water to that

* I could produce many instances of this, but the most striking is to be seen (May 1828) on a farm between Dunfermline and the Rumbling Bridge.

of clear spring water most strikingly manifested.*

Every water meadow that is properly managed is made ready to receive the first autumnal floods. It is a rule with the Wiltshire and Gloucestershire irrigators (and that rule stands good in every country) to use as much water through the winter as possible, which not only shelters the grass, but leaves a considerable quantity of fertilizing manure—both contributing to assist vegetation through the dead of winter, and making the grass display the most pleasing appearance of spring, when the surrounding lands bear not the least sign of renewed vegetation, or are even covered with snow. Some imagine this effect to be produced by the warmth of the water, others may attribute it to a decomposition which it may be supposed to undergo, or to such sediments as it may deposite; but whatever be the cause, it is certain that if this opportunity be neglected, the crop will be defective in proportion. However authors may disagree on this interesting subject, I believe all experimentalists acknowledge, that early winter watering is necessary to produce early and abundant vegetation. In what way this operates is, as to practical purposes, less material.

It has been sometimes observed or alleged, that the quality of the hay made from water meadows is inferior to all other hay; but every one acquainted with the process of making hay from this grass, knows how much the good or bad quality of it depends on the management. I strongly suspect, where there is any real reason to complain of water meadow hay, it must have arisen from the grass having been allowed to stand too long before it was cut, which renders sown grass hay, as well as that of water meadows, as little nutritious as straw; or otherwise from mismanagement in the hay making.†

The hay made from several irrigated meadows in Dumfriesshire and Peeblesshire will fatten a bullock or sheep as soon as the best clover hay in the country.

The late Sir George Montgomery, Bart. of Magbiehill, who perhaps has paid as much attention to the management of water meadows, and the making of water meadow hay, as any individual in Scotland, not only gave it to his hunters, but fattened part of his flock with it; indeed there were many instances of gentlemen from England preferring his water meadow hay for their carriage horses to any other kind.

After the hay is carried off, the water is sometimes put on for a day or two to promote the growth of the aftermath; and this practice may do no harm where the aftermath is to be eaten by any other stock than sheep, but wherever sheep are to eat off the aftergrass, (unless intended for the butcher,) it is not thought advisable; for summer watering produces so very rapid a growth, and the grass imbibes so much moisture, that it is apt to cause the rot in sheep;* but neither the first crop nor aftermath, produced from mere winter irrigation, has ever been observed to have any tendency to occasion that disorder.

A water meadow attached to any farm gives the farmer a great command of manure for the part he keeps in tillage, for he carries away and converts into dung the whole of its produce of hay every year, whilst it requires nothing in return but the watering, and meanwhile is every year improving in quality and in the increase of its produce. The advantage will, no doubt, be the greater, in proportion to the richness of the water he has in his power to employ: witness the extraordinary crops of grass that are yearly carried from the meadows below Edinburgh, to feed cows in the neighborhood of that city. The grass of these meadows is cut five or six times in a year; but to support that extraordinary growth, the water is put on for a day or two immediately after every cutting; and, although it is never clear, the cattle eat the grass with the greatest keenness, which strongly militates against Mr. Smith's favorite idea of the superiority of irrigating with clear spring water.

Amongst the many prejudices against the practice of irrigation, those which relate to the quality of water, and season for using it, are the most important. All water, except what comes immediately from poisonous minerals, let it be ever so clear, is beneficial to vegetation; if properly employed, it invariably produces such grasses as are most congenial to the soil.

Irrigation, like many other operations, is but ill understood; and I am fully convinced that its ill success is more owing to bad formation and improper management than to any uncongenial qualities of the water. The general defect of crop arises from a scarcity of water and its untimely application; for, instead of wetting the ground like a shower of rain, which many unacquainted with the art suppose to be all that is necessary, the water must continue running over the surface of the ground all winter, except for a few fine days at a time, to give air and strength to the young grass, where the water may have run too rapidly or too slowly over it.

At the beginning of the month of October, each feeder and drain should be cleansed, and the banks of the feeders repaired where they have received damage by the treading of cattle. The whole works being all repaired, and there being generally water enough at this season, either for the whole or for part, the sluice should be drawn, when, in the course of half an hour, the conductor and upper part of the feeders will be nearly filled.

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*The practice of irrigating with muddy water is in general use in the Mexican states, every attention being there paid to collecting the water at the time of floods into canals made on purpose, and which is afterwards used in irrigating the land.

†One of the few proprietors who pay particular attention to the making of meadow hay, is G. S. Menteath, Esq. of Closeburn. In 1828, Mr. Menteath commenced making hay in the last week of June, and in the very short period of eighteen days the whole crop (averaging three hundred stone per English acre) of one hundred and five acres was made, and carried from the fields and put into Dutch barns. If other proprietors would pay the same attention to cutting, making, and securing their natural or water meadow hay, there would be no reason for complaining of its quality.

*This was the case with a water meadow at Inverardran, near Tynedrum, in 1827. An extraordinary flood having covered the meadow immediately after the hay was cut, it produced the same effect on sheep as summer watering.

The first operation of the irrigator is to adjust the water in the conductor, or, if the meadow is in more parts than one, the water in each conductor must be first regulated; then he commences anew by regulating the stops in the first feeder, but should there not be sufficient water in the feeder, a little more must be let in, by making the aperture wider or deeper, till the water flows regularly over the sides, from one end to the other; from the first, he proceeds to the second feeder, and so on, until the water in all the feeders is adjusted.

Let the beds of a water meadow be ever so well formed, yet, by some places sinking more than others, or by the ice raising the surface of the ground, although the water along the banks of the feeders have been ever so nicely adjusted, it often happens that there may be some places between the feeders and drains with too little water, when it will be advisable for the manager to make a third round, redressing inequalities of the surface so as to give every spot an inch deep of water. Every part of the works being regulated, the water should be allowed to run through the whole of October, November, December, and January, from fifteen to twenty days at a time, without intermission. At the expiration of these periods, the ground should be made completely dry for five or six days, to give it air; for there are few species of grasses, which form the most nutritious part of the herbage of water meadows, that will long exist under an entire immersion of water. Moreover, if the frost should be severe and the water begin to freeze, the watering must be discontinued, otherwise the whole surface will become one sheet of ice; and wherever the ice takes hold of the ground, it will undoubtedly draw it into heaps, which is very injurious to the plants.

The object of this early preparation of the meadows is to take advantage of the autumnal floods, which bring along with them a variety of putrescent matter, which is found very enriching to land. It is the chief object of the irrigator in those months to collect as much of this manure as possible, and, at the same time, to shelter the land from the severity of frosty nights; it is therefore requisite to use as much water as the land will carry without guttering. I believe it would be difficult to give land with a dry sub-soil, and considerable descent, too much water before the weather begins to get warm. It is necessary in those months that the meadows be inspected at least once in three or four days, to see that the equal distribution of the water is not obstructed by the continual accumulation of weeds, &c.

In February, more attention is required by the manager, for the grass is then beginning to spring; therefore, if the weather should be mild, and you suffer the water to run over the meadow too long without intermission, a white scum is generated, which is very destructive to the tender grass: so is frost, for if the water has been taken off so late in the evening as not to give the ground time to dry before the frost sets in, considerable injury will be done to the tender plants. To guard against the former of these evils, the water should not be suffered to run longer at each intermission than six or eight days; and to avoid the other, (the frost,) the water should always be taken off early in the morning, for if the land experience a drying day, the frost at night will do little injury.

In March, the same instructions must be observed as in last month, except where the climate will admit of spring feeding, as in the south of England, where the crop of grass is generally sufficient for any kind of stock in the middle of this month; therefore, in such situations, the water meadows must be made completely dry before the stock be admitted.

The latter end of March and the beginning of April are the most trying times in this climate to the tender grasses of an irrigated meadow, therefore every attention must be paid to the distribution of the water: it must be used more sparingly than in autumn or winter, not allowing it to run longer than five or six days at each intermission; and as the weather becomes warmer, two or three days at each time will be quite sufficient, until the end of May, when all watering for the season ought to cease, for the grass on all old meadows will shelter the ground at this period, so that the sun will have little or no effect on the roots of the plants.

Another particular reason why the watering ought to be discontinued at the above time, is this —when the water is suffered to run too long in the spring, after the grass has become thick and long, the water is apt to leave a sediment on the blades, which makes it not only very difficult to cut, but is very injurious to the hay. Above all, particular attention must be paid to make the whole of the ground quite dry; for should a small quantity of water be permitted to run to the lower ends of the beds, the grass there will lodge, and, before the remainder is ready for cutting, be half rotten; or a greater part of the finer grasses will be banished, for the reception of rushes and other aquatic plants. Want of due attention to this precaution and allowing the water to run too long, with imperfect draining, are the principal reasons why the water meadow hay is sometimes of less value than most other kinds.

The advantages of irrigated meadows.

The great object of agricultural improvement certainly is to raise the greatest possible quantity of animal and vegetable food for the support of human life. In this view, the introduction of the turnip and sown grass husbandry is justly considered as a most essential improvement; not only as affording a more plentiful supply of nourishing and fattening food during the winter and spring months, and preparing the land and tillage for bearing more plentiful crops of corn, but giving a greater supply of manure. Now, in regard to procuring an additional supply of nourishing food for animals through winter, early succulent food for spring, and more particularly in increasing the quantity of manure, as already observed in a previous page, water meadows may well be ranked as a most valuable improvement.

In what follows, I shall state what has occurred to my own observation in the course of my profession, as to the profit to be derived from water meadows in England and Sweden, but more particularly in Scotland; in which country, as already observed in the Preface, there is so much demand for additional supply of winter food for cattle, and so much facility of acquiring this supply by the establishment of water meadows.

I begin my statements with a few examples from England.

The proprietor of an old irrigated meadow, containing eight acres, in the vicinity of the village where I was born, (South Cerney, Gloucestershire,) disposed of the produce of it, in the year 1795, in a way that was well calculated to ascertain its real value.

In order to make the most of the spring feed, the grass was saved till the second day of April; from which time he let it to the neighboring farmers, to be eaten off in five weeks at the following rates:—a sheep, 10d. per week; a cow, 3s. 6d.; and a colt, 4s.;—one hundred and seven wether sheep, one week, £4 9s. 2d.; eight cows, £1 8s.; four colts, 16s.; three colts, three weeks, to be added, £1 16s. The whole produce of the meadow, £35 1s. 10d., or upwards of £4 per acre. The hay crop was, as usual, about fifteen tons, and was six weeks in growing.

But the reader will perhaps see the advantage of irrigation in a still stronger light, when he is told that this meadow, which was watered by the stream that drove a mill, and which, at the time of the foregoing statement, was occupied by a miller, was a few years before in the hands of a farmer who, living at variance with the miller, was entirely deprived of the use of the water for a whole winter, which unfortunately was succeeded by a very dry spring and summer; of course the spring feed was lost, and the whole of the hay crop of eight acres was only three tons.

An irrigated meadow of nine acres was laid out in 1802, by Mr. Smith, engineer and mineralogist, on the Paisley farm, near Woburn, belonging to his Grace the Duke of Bedford, and, in 1803, produced as follows:—in the month of March, the meadow was stocked with two hundred and forty sheep, for three weeks, at 6d. each per week, £18, making the spring feed worth £2 per acre. In June, mowed two tons of hay per acre, at £4 per ton, £72. August 20—again mowed one ton and a half per acre, at £4 per ton, £36. September 16—put on eighty fat sheep for three weeks, at 4d. each per week, £4; and then it fed lean bullocks, which are not reckoned in the account, producing £16 13s. 8d. per acre.

I conceive it unnecessary to refer the reader to more instances of irrigating grass land in England, but would rather advert more particularly to the benefits derived from the practice where we have not only an inferior soil, but all the vicissitudes of a northern climate to encounter, even where the ground is covered with snow and ice for several months in the year; but even there I hope to be able to show that the art of irrigation, when systematically attended to, is one of the greatest improvements to be found in the annals of agriculture.

In the year 1808, I was employed to survey, with regard to draining, a large tract of boggy land, belonging to Mrs. Grill of Söderfors Iron Manufactory, in the province of Upland, in Sweden. After having taken a general view of upwards of three hundred Scotch acres, I found about eighty lying nearest the large river Dal, coming from the province of Darcarlia, well situated for irrigation; and although there was nothing of the kind in the country previously to that time, the proprietress, at the first suggestion, determined, whatever the expense might be, to have an irrigated meadow formed, complete in all its parts; for she was confident that draining, in the first place, and afterwards irrigating for grass, would undoubtedly be one of the greatest improvements to a country, where the summers are so generally very dry, and, of course, hay very scarce.

The whole of this tract was reclaimed from the bed and overflowing of the above mentioned river, by a very expensive embankment, about sixty years before; but the drainage had been so badly executed, that what was not covered with water was a perfect bog, over which it was impossible for a person to walk without sinking up to the knees, which made the whole crop on eighty acres only eleven hundred and fifty stone.

Forty acres were formed into an irrigated meadow late in the spring of 1809, which injured the surface so much, that the crop was the same as it had been previous to the formation.

In 1810, the hay crop on forty acres was four thousand stone; within that year the other forty acres were formed into shape for a water meadow; and, in 1811, the hay crop on the whole was eleven thousand two hundred and fifty stone; in 1812, the frost damaged the crop so much, that the whole was only four thousand five hundred and fifty; and, in 1813, the crop was eleven thousand two hundred and fifty stone, but had not the frost on the 21st, 22d, and 23d June, very much damaged the grass, the crop would have been one-third more. The hay, since the commencement of the irrigation, is twice as good in quality, and I have not the least doubt, if the works are kept in proper repair, that the crops of hay and aftermath are double what they were at the time of the original publication of this account in 1814, at Stockholm, in the Annals of the Swedish Royal Academy of Agriculture.

The expense of forming this meadow, according to the value of our money, was three hundred pounds, or nearly four pounds per acre; by which it appears that, although the climate of northern countries is so very much against the practice, yet the improvement is one of the greatest that has been introduced into a district where it is impossible to procure manure for making improvements in any other way, and that wherever water can be brought to run over grass land, the benefit will richly reimburse any person for the money laid out. Since the formation of this meadow, several others have been made in different parts of the country with greater success, they being made on better land; which no doubt will, within a few years, diffuse the practice through the greater part of that country.

Irrigation in Scotland.

This species of improvement seems to have been formerly practised in several places in Scotland; in the parish of Dolphington, Lanarkshire, and in many places in Perthshire, traces are found of water having been carried over the surface of the ground, but as to when these were formed, there are no people living who can give an account. However, there is every reason to believe that the practice of irrigation never went farther in Scotland than a partial wetting of the land, until the year 1792, when my father, Charles Stevens, was engaged by the Highland Society

to make a general survey through the principal parts of Scotland, with regard to introducing the practice scientifically.

After having traversed the grater part of the country, introducing irrigated meadows into Caithnessshire, Clackmannanshire, Peeblesshire, Perthshire, &c., my father was engaged by his Grace the Duke of Buccleuch, in 1798, to lay out and superintend the making of as many water meadows as should be found practicable, and at the same time advisable, on his grass farms in the south of Scotland—the tenants paying interest on the capital laid out. On these terms, several hundred acres were formed into water meadows, at an expense of from four pounds to six pounds per acre, which were regularly managed for several years; but the greater number of the tenants being forced into this improvement,* and grain, in the time of war, getting so very dear, the most of them thought it would be more advantageous to plough them up; but a few of the more enterprising tenants, being convinced that a crop of hay and the aftergrass would be of more benefit to them than any crop of grain they could produce, have been fortunate enough to keep their meadows entire. Although they are not so well managed as they ought to be, yet the crops are sufficiently abundant to prove that it was neither the quality of the soil nor poorness of the water that caused their failure, but the carelessness and bad management of the occupiers. To prove this assertion, I need only mention two or three meadows on his Grace's estate which are similarly situated, both with regard to soil and water, with the meadows ploughed up.

Kirkhouse meadow, in the parish of Traquair, contains nine Scotch acres, and was the first scientifically formed irrigated meadow in Scotland; the land, in its original state, was valued at 5s. per acre of yearly rent; the formation cost £4 per acre; but the hay crop for the last twenty years has averaged two hundred and sixty stone per acre, and the aftergrass 12s. per acre—making upwards of £7 per acre of gross produce. About the same time an irrigated meadow was made at Kirkhope, on the Ettrick, and another at Mount Benger Burn, on the Yarrow, which, according to the tenants' own account, pays them better than any piece of land of the same extent on their farms, although the land, in its natural state, was worth little or nothing.

I should think those instances of the advantage of irrigation, even in high pastural districts, are sufficient to put the utility of the practice beyond all doubt, and the public on their guard against any imposition.

On Lord Traquair's property, there are three irrigated meadows; two of them are so much neglected, that there is every reason to believe that they, in a very short time, will share the same fate with many of the Duke of Buccleuch's; but the third one, on Orchard Mains farm, of about twelve acres, which is tolerably well managed, gives about three hundred stone of hay per acre.

Robert Nutter Campbell, Esq. of Kailzie, commenced irrigating in 1797, by forming five and three-fourth acres of the lower part of his lawn into water meadow; the land, in its natural state, was worth £2 per acre of yearly rent, the formation cost £7 10s. per acre, and the average crop of hay for the last twenty years has been three hundred stone per acre, of so superior a quality, that several gentlemen prefer it to clover and rye-grass hay for their riding horses. It is generally worth 8d. per stone, and the aftergrass 20s. per acre, which makes the gross produce of the land £11 per acre. Mr. Campbell has another water meadow, eight and three-fourth acres, formed out of a perfect bog, only worth 5s. per acre before the formation, which cost £5 10s. per acre. It generally gives two hundred stone of hay per acre, worth 6d. per stone, and aftergrass 10s. per acre, making £5 10s. per acre of gross produce, instead of 5s. If the supply of water were more abundant, these meadows would produce considerably more.

The late Sir George Montgomery, Bart. of Magbiehill, in Peeblesshire, commenced irrigating in 1798, by forming about an acre into water meadow. This little experimental meadow turned out so productive, that the baronet continued operations on a larger scale, by collecting the small streams that ran through his property to aid him in procuring as much natural hay as possible by irrigation. He, therefore, in the year 1815, converted the lowlands at the Plewlands into irrigated meadows; they contain nine acres, and consist partly of boggy and partly of dry soil, worth £2 per acre in their original state. The effect of this improvement, for several years past, has been three hundred stone of very superior hay, per acre averaging 8d. per stone,* and the aftergrass 20s. per acre, which makes the gross produce of the land worth £11 per acre. Sir George has cut these meadows sometimes twice a year, but owing to the high climate, he found it more advantageous only to cut them once, and commence feeding off the aftergrass earlier in the autumn. The expense of making those meadows was £5 per acre.

In 1813, the Whitefield meadows were formed into bed-work; the greater part was so boggy that the miserable crop of grass was obliged to be dragged or carried to the surrounding high ground, there to be made into hay, which hardly paid the expense of collecting; but the land, since it was irrigated, is completely dry, and the crop of hay is of a superior quality, and is never less than two hundred and fifty stone per acre; which, at 6d. per stone. with the aftergrass at eighteen shillings per acre, makes upwards of seven pounds per acre of gross produce.

If those meadows were sufficiently supplied

*A little after the middle of last century, the late Adam Kennedy, Esq. of Romano, endeavored to introduce potatoes and turnips into the tenants' rotation of crops, by offering a deduction of one pound per acre from the rent for every acre under turnips and potatoes; but a scheme thus proposed by the landlord was suspected as tending to his own interest only, and the effect of the premium was extremely limited. However, when Mr. M'Dougal, from Roxburghshire, commenced his system on a farm at Linton in 1778, farming at his own risk, the system was immediately adopted universally. (See the Rev. Mr. Findlater's Agricultural Report of Peeblesshire.)

*The hay which those meadows produced in 1826 was sold by public sale as high as 1s. 4d. per stone of twenty-two lbs.

with water, although they are situated in a very bleak country without the least shelter, the crop of hay would be considerably more; they contain nineteen acres, and cost in the formation six pounds per acre.

Fallows meadow, on Sir George's large sheep farm, contains fifteen acres, was enclosed from moorland in 1816, and, by collecting the water from the surrounding sheep drains, five acres are partially irrigated, and the remaining ten are top-dressed with the manure made from part of the produce, which is consumed in winter by the sheep of the farm in a wooden shed near the meadow.

By this simple method of improvement, fifteen acres of common sheep pasture land give the proprietor from three thousand five hundred to four thousand stone of hay per annum, averaging 6d. per stone.* What an immense advantage to a sheep farm! By this simple process of enclosing and cutting a few small feeders and drains, the owner is enabled to provide food for his flock, when his less fortunate neighbors' sheep must either starve or be supplied from the farm yard; but I am afraid there are but very few sheep farmers who are so fortunate as to have any hay over and above what is requisite for stock at home.

Sir George fed the same number of sheep on the farm as he did before the meadow was cut off and enclosed; and I am fully persuaded that the same improvement might be made on almost every sheep farm in Tweeddale, for, in almost all of them, there are situations where five, ten, or fifteen acres might be enclosed and partially irrigated, as in every pastoral district there are numerous rills which might be easily collected and used to the greatest advantage at a very trifling expense; so that instead of being obliged, in snow storms, to send fifty thousand sheep to a milder climate of the southern parts of Dumfriesshire, (when the owners are obliged to be at the mercy of their southern neighbors, not to mention the very serious injury the flocks receive by so long and fatiguing a journey,) by adopting the above system of improvement, a considerable portion of the losses generally sustained would be prevented.

Sir Thomas Gibson Carmichael, Baronet, of Castle Craig, is another liberal promoter of this useful art. He commenced in the year 1817, by forming five acres with the plough and spade into regular bed-work. The land in its natural state was a complete peat bog, valued at 8s. of yearly rent per acre.

The formation was difficult, on account of the great number of deep peat holes, which were obliged to be filled, to bring the surface to a proper level. The expense of levelling and forming the beds was £6 per acre, the crop of hay in 1824 was four hundred and sixty-six stone (twenty-two pounds to the stone) per acre, valued at 5d. per stone, and the aftergrass at 18s. per acre, making £10 12s. 2d. per acre of gross produce.

Immediately above this, another meadow was formed, in 1819, into bed-work, containing seven acres; and, a little farther up the same stream, a third was made, in 1823, of the same extent with the last. The soil of those two meadows is partly clay and partly moss, with a thin covering of clay on the surface, the moss in many places being from four to seven feet deep. The whole is regularly laid into beds from thirty to sixty feet wide, at an expense of £4 per acre, and sown with Yorkshire fog, foxtail, and perennial ryegrass seed. The former of those meadows gave, in 1824, the same quantity of hay per acre as the five acre meadow, but of a superior quality; and the latter two hundred and fifty stone per acre, the greater part fiorin grass, *(agrostis stolonifera.)* Those meadows are irrigated by the little river Tarth, the water of which is superior to any water in the country, both with regard to richness, and being less subject to freeze than water in general is in high situations; moreover, the supply is abundant, which not only makes the management easy, but gives the proprietor considerable advantage over his neighbors. The aftergrass is generally worth 18s. per acre of yearly rent.

On my return from Sweden in 1822, the first irrigated meadow I was employed in making was for G. S. Menteath, Esq. of Closeburn, in Dumfriesshire. Mr. Menteath had commenced operations before my arrival, by levelling some inequalities in a field near his house, which was well suited for the purpose; but not having a person sufficiently skilled in the science of irrigation, Mr. Menteath availed himself of my assistance.

After having surveyed the ground, I found that a large range of meadows might be scientifically formed, so complete in all their parts, that, whatever capital might be expended in the formation, there could not be the least doubt of a good return in three or four years. The proprietor, having viewed the system of irrigation with that penetration which he exhibits in every branch of agriculture, was determined not to lose any time in forming, in the most accurate way, into water meadows, at any reasonable expense, those parts of his property which were contiguous to the mansion-house. To put this grand plan into execution, it was thought advisable to commence with forming a piece of land, lying immediately below the lime kilns, into bed-work. The water to be used being brought from a great distance to drive the machinery at the said lime kilns before it enters the meadow, and, in its course, collecting a considerable quantity of the finer particles of lime, its effects are truly astonishing. The first crop of hay, in 1824, which was of a superior quality, was four hundred and twenty stones per acre, valued at 8d. per stone, £14; the second crop, the same year, was sold to the neighboring people on the ground for £4 5s. per acre; and the aftergrass was valued at 15s. per acre—making the whole produce of one year £19 per acre. The value of the ground before it was irrigated was £3 per acre. The proprietor, thinking the beds of this productive piece of land too flat to receive all the advantage that irrigation is capable of imparting, has since been at the additional expense of £3 per acre for lifting the turf; and after having raised the beds in the centre twelve inches higher than the surface of the ground at the sides of the drains, has laid down the turf again. This is, undoubtedly, an excellent method, and will not only give the manager an opportunity of using more water in a given time, and thereby collecting

*The hay of this meadow was sold, in 1826, at from 1s. to 1s. 3d. per stone.

a larger quantity of manure, but, from preventing the possibility of stagnation, will prevent the growth of rushes and other aquatic plants. The expense of levelling and forming this meadow was £7 per acre.

The next operation was to form the lawn, containing twenty-five English acres, into catch-work irrigation; (plan 2.) which was done by making the feeders parallel with the slope of the ground, and equidistant from each other; the whole so arranged that not one of the works is seen from the house. As the greater portion of the ground was very unlevel, the most of the turf was lifted and the land ploughed, not only to facilitate the levelling, but to loosen the sub-soil, before replacing the turf. Amongst the numerous improvements made in the art of irrigation, loosening the sub-soil is one of the greatest; and I have not the least doubt, that by merely moving the soil, and laying the sod down again, it will make a great improvement on grass land of any kind.

The land of this meadow, before being watered, was worth £3 10s. per acre; the expense of levelling and formation, £5 per acre. The produce of 1824 was as follows:—spring feed for two hundred ewes and lambs, from the 7th of March to the 1st of May, making seven weeks, at 5d. each per week, £29 3s. 4d.; the crop of hay three hundred stone per acre, valued at 8d. per stone, £250; the aftergrass at 20s. per acre, £25—making upwards of £12 per acre. The quality of the hay is equal to that of any clover hay in the kingdom.*

Between this meadow and the first mentioned are two other meadows, composed of nothing but moss; indeed they are formed where the people formerly digged their peats. The one, containing nine and a half acres, is regularly formed with the spade into bed-work of sixty feet wide; and the other, eleven and a half acres, into a catch-work meadow. Their value, before being watered, was only 25s. of yearly rent per acre, but the average crop of hay since they were watered is two hundred and fifty stone per acre, besides aftermath. The expense of levelling and forming was £3 10s. per acre.

Mr. Menteath's views do not stop here, for he has other tracts of mossy land lying farther down the rivulet, of equal extent, and equally capable of being irrigated by means of catching the same water again. For this purpose, twenty-five acres have been levelled with the spade, and formed into bed-work meadow, and laid down with such grass as is calculated for the reception of water. Not only the last mentioned twenty-five acres, but twenty-one acres more of the Closeburn meadows, are composed of nothing but moss, which had been improved by means of levelling, paring, burning, and liming very strongly, and working it with the greatest possible care, before it was laid down to grass. But although the crop of grass, for the first two or three years, was tolerably good, it was not so great as might have been expected, compared with the expense that had been laid out on the land; for which reason the proprietor was determined to try the effects of irrigation, which last experiment has been most satisfactory, the land producing, since the application of water, double what it ever did before in its most productive state. Few people are aware of the great improvement grass land, composed of moss, is capable of receiving, by a mere wetting in dry seasons; for the greater part of improved moss gets so very porous, that the roots of the grasses are more exposed in dry weather than they are in any other soil; therefore, wherever water can be brought to run over the surface of grass land that has been lately reclaimed from moss, if only for a few hours at a time in dry seasons, the evil will not only be remedied, but a plentiful crop of hay and grass will be the result.

To obtain a sufficient supply of water for irrigating those extensive meadows, the proprietor has been obliged to make new water-courses, to bring the water from different rivulets, situated between three and four hundred feet above the level of the meadows, and at a distance of more than three miles.* These operations have been attended with considerable expense; but when we consider that, by these means, he has not only the advantage of a regular and abundant supply of water for winter irrigation, but is thus also enabled to give an occasional wetting to two hundred acres of other pasture land at pleasure, which is certainly of the greatest consequence to a property, such expense has not been misapplied.

I should by no means do justice to this interesting subject, if I did not mention that the proprietor's views, from the very commencement, were both winter irrigation of his meadows and partial wetting of his pasture fields; therefore, to be enabled to receive the greatest benefit from those streams of water, a field of twelve acres was levelled, in 1826, by lifting the turf; and, after loosening the sub-soil and levelling the surface, the turf was laid down again. The expense of this operation was £3 per acre; and, by means of a few catch-work feeders, the whole field can be partially watered at pleasure.

The proprietor is so confident of the superior advantage of this new branch of husbandry, that he is determined to prosecute the plan to a considerable extent.

Part of the water used in irrigating the above meadows, runs through a considerable extent of land which has been improved by the present proprietor from black or heathy ground, (moor pasture,) whereof eight hundred acres were pared and burnt; and the whole, with a large extent of other land, has been very strongly limed, which accounts, in a great measure, for the good effects of the water.†

William Loch, Esq. of Rachan, being desirous of having an irrigated meadow quite complete in

*The second crop of hay that was cut from these meadows in 1826, was sold for £4 10s. per English acre.

*To insure a full supply of water, for giving the meadows and pasture land a wetting in dry seasons, Mr. Menteath has made an additional reservoir, extending over more than fifty acres.

†Mr. Menteath is determined to prosecute the system of irrigation, on a scale of two hundred acres, on a property he has lately purchased in Ayrshire, lying on the north bank of the river Nith; for which purpose he has already agreed with the tenants for part of the land, for commencing operations with the plough, and laying the whole down in a regular form, which, when finished, will be the most regular and complete range of water meadows in Great Britain.

all its parts, requested me to survey such of his lands as were suitable for the operation. After taking the necessary levels of a field, lying on both sides of the river Biggar, it was found that by the straightening of the water-course where it enters the meadow, the water would have a greater rapidity; and by erecting a dam twenty-one inches high across the new cut, that not only this field of eight acres, but other lands of greater extent might be properly irrigated, without injuring the neighboring land. Having communicated this to the proprietor, he desired me to commence operations. The first operation was to straighten the water-course, (plan 1.) make the dam, and build the sluices, to admit the water into the meadow at pleasure; and, as the greater part was generally overflowed at every flood, to make an embankment on the west side above the dam, and another on the east side below, to protect the works and other fields of the proprietor. The land is partly composed of clay, with a gravelly sub-soil, and, in some places, mostly gravel both in soil and sub-soil. The surface was very unlevel, so much so, that in several places it was necessary to reduce it from ten to fifteen inches, to bring it to a level. The beds are formed for thirty to forty feet wide, with a rise in the centre of nearly twelve inches, so that every drop of water is kept in motion. The expense of cutting the river, making the embankment, building sluices, and forming the beds, was £9 per acre. The supply of water is quite adequate for the whole at all seasons, which very much facilitates the management; and the quality of the water is superior to any in the district. The superior quality of the water of the river Biggar for irrigating grass land, gives the proprietor a very considerable advantage over many who have not tried the experiment, both by producing a larger crop and finer hay; and although this meadow was made late in the spring of 1823, the crop of hay in 1825 was judged by the neighbors to be upwards of four hundred stone per acre, worth 6d. per stone; and the aftermath £1 per acre; making the gross produce worth £11 per acre, instead of £2 per acre, at which the land was valued before being irrigated. No expense was spared in the formation; indeed I flatter myself that this meadow is as complete a specimen as any in the kingdom, and have not the least doubt, if a regular management be carried on, that the product will be still larger, although situated in a high country.

Many large tracts of natural meadow land, lying on both sides of the river Biggar, in its present state of very little value, might be irrigated with equal advantage, if the proprietors would only enter into the spirit of it, which would not only be of the greatest benefit to themselves, but for the whole community, by not only taking away so much stagnated water, which is so injurious to the neighboring land, but by collecting many thousand cart loads of the richest manure, which is yearly precipitated into the sea.

There are upwards of fifty acres of irrigated meadow land on the Dolphington property, belonging to Richard Mackenzie, Esq. W. S. Several years ago the tenants on the said property commenced irrigating their grass land, the greater part of which was bog; and although the system practised has been very imperfect, it has given a considerable quantity of coarse hay. But the proprietor, suspecting the water might be used to much greater advantage by a proper drainage and formation, has been at a considerable expense, in conjunction with the neighboring proprietors, in straightening the river Tarth, to give a proper outlet to the surrounding boggy lands. By this means he has been able to irrigate eighteen acres in a regular manner, at an expense (including enclosing) of £8 per acre. The land in its original state was not worth more than 2s. 6d. per acre of yearly rent, the whole, excepting three acres which were covered with heath, being composed of moss from two to five feet deep, upon a bottom of fine sand. Although the heathy part was only made into meadow in 1824, the greater part of the heath is already gone, and the finer grasses now nearly cover the ground; indeed the whole meadow is so much improved, that a considerable portion of it gives upwards of two hundred stone of hay per acre per annum.

Townfoot meadow, containing about five acres, and belonging to the same property, has been partially watered by the tenant for several years, and in such places where the water ran freely off without stagnating, gave a considerable quantity of coarse hay; but since being properly drained, and regularly formed into beds, the hay has become infinitely finer.

These operations have diffused a spirit of improvement among the tenants, and instead of their carrying on the irrigation in the old slovenly manner, they have considerably improved the formation of their meadows, and are more attentive to the management of them.

In the spring of 1828, a small meadow was made by means of lifting the turf, levelling the ground with the spade and barrow, and laying down the turf again, at an expense of upwards of £20 per acre, which, in the same year, gave three hundred stone of hay per acre. Another meadow, containing four acres, was levelled at the same time, formed into beds, and sown with grass seeds, which would be ready for receiving the water in the autumn of 1829. And, lastly, Mr. Mackenzie was then (February 1829) busy in remodelling an old meadow, containing four acres, which, through bad management, had become a perfect bog. Some small patches of water meadow on the same property are cut several times a year, the produce of which gives a large quantity of manure to the other lands.

General Dunlop commenced irrigation at Southwick in Galloway in 1824, by forming ten acres with the plough and spade into bed-work meadow, and laying it down again with grass seeds best adapted for the soil.

Since that period the General has formed forty acres more into bed-work meadow, by means of lifting the turf, and levelling the surface of the ground with the spade and wheelbarrow, and laying down the turf again.

These operations, including making the large conductor, (which is eight feet wide in the bottom, and nearly a mile in length before it enters the meadows,) building sluices and bridges over the large conductor, making the small feeders and drains, with the expense of wheelbarrows, &c. cost £9 per acre.

The sub-soil is composed of very fine sand mixed with some very fine particles of clay, and the fine pores of the sand are filled with water,

which causes the whole mass to run when worked in wet we ather. The sub-soil being thus saturated with water, and there being no fall to drain it, the land is kept cold till late in the spring, thereby preventing spring food for ewes and lambs. In all other respects, the land and climate are well adapted for irrigation. Although these meadows are under peculiar circumstances, there can be no doubt of their success, if the same management be persevered in. To prove this, I will refer the reader to the following extract of a letter from the proprietor, dated 27th September 1818.

"I cannot furnish you with any account of the quantity of hay produced by my water meadows this season, not having been myself at home when the hay was made and the produce carried. I saw them, however, before they were cut, and the produce was very abundant indeed, where heights had not been reduced; where these had been lowered in order to preserve the level, the quantity of grass was comparatively small. I am, however, persuaded that both my first and second crop is at least double the quantity the ground would have produced had it not been watered; and I am the better able to judge of this, from having meadows adjacent to my water meadows of similar quality, but not irrigated, with which I can compare.

"The only point in which I have hitherto been disappointed, is in the earliness of the spring. The spring on my meadows is more backward than I had expected it would be; so much so, that hitherto I have seen no cause to expect they will ever afford me a valuable resource for feeding sheep in April, or even early in May."

I had the management of laying out a range of watered meadows for his Grace the Duke of Athol at Dunkeld, in the autumn of 1827. They contain thirty English acres, partly bed-work and partly catch-work. The land is mostly of a peaty nature, here and there mixed with a clayey substance. The field is divided into different divisions, forming distinct parts, which can be irrigated separately. The water that irrigates the first division is caught for irrigating the third division; what is used in watering the second division is caught again to water the fourth; and what supplies the third division is caught for watering the fifth portion: the whole being so arranged that all the water from the first four divisions can be caught to irrigate another range of meadows, which his Grace is intending to make at some future period.

The formation of those meadows is perfect in every respect, for every possible pains have been taken to make the most of the water; and, to accelerate the carrying away of the produce, a road is made through them.

The expense of formation, including sluices and bridges, was £7 per acre. The whole extent, in 1826, only gave a few hundred stone of hay; the crop of 1828 was four thousand stone, and had not the surface of the ground been so much broken under the operation of forming, a much larger crop might have been expected.

The soil of those meadows is so particularly well adapted for irrigation, that there cannot be the least doubt, if they are properly managed, that they will give at least three hundred stone of good hay per acre per annum, besides aftermath; and I venture to say, that if his Grace's meadows do not succeed, it will not be owing to any fault in the formation, soil, or water, but altogether carelessness in the management. In the autumn of 1826, Viscount Strathallan commenced irrigation, by forming fifteen acres, the greater part catch-work meadow, lying on the banks of the river Machany. The soil is partly alluvial and partly gravel beds, the overflowing of the river having washed away the greater part of the good soil; which made the value of the land, previously to its being watered, only worth from 20s. to 30s. per acre of yearly rent. About twelve acres are occupied by Messrs. John and Andrew Crawford, who pay interest for the capital expended. The crop of hay and grass, in 1827, was very good, but the crop of 1828 was very abundant and of the best quality, which was greatly owing to good management; for it is evident that if a water meadow is not well managed, the crop will not only be very deficient, but wherever the water is allowed to run at random, the grass will either be stinted in its growth for want of water, or will become coarse in those places where it has got too much and the greater part will be composed of aquatic plants.*

Neither of these extremities can be attributed to the management of those meadows, for the tenants pay every attention to them; indeed, if all water meadows were as well taken care of, there would be no occasion for complaint against the system; and instead of the practice creeping so slowly into the country, many thousand acres of barren soil would long ere now have been as productive as the best land in the kingdom.

An experimental water meadow was made in 1826 on the farm of Forr, near Crieff,† the pro-

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* I have since been favored with the following letter from the tenants:—

"*Ladystoun, 2d March,* 1832.

"Sir—According to promise, we send you an account of our water meadows, viz:—

"Ladystoun meadow, on an average of years, produces from two hundred and fifty to two hundred and eighty stones (tron weight) of hay per Scotch acre. The expense of keeping is about 5s. per acre yearly.

"Milnton meadow produces, on an average, from three hundred to three hundred and twenty stones. The expense of management about the same, and is still improving.

"The land is thus of a great deal more value to us, besides the advantage derived from having the earliest and latest cutting grass in the district.

We are, Sir,

Your obedient Servants,

JOHN CRAWFORD.

To Geo. Stephens, Esq. A. J. CRAWFORD."

†The following letter contains the sentiments of one of Lord Willoughby's tenants on the subject of irrigation:—

"*South Forr, near Crieff,* 24 *Oct.* 1828.

"Sir—As you are going to publish a second edition of your Essay on Irrigation, &c., I should neither do justice to you nor the system, if I neglected to acknowledge the great benefit I have received from the watered meadow you had the management of making on my farm, in the autumn of 1826. The crop of hay this year (1828) was upwards of three hundred stone per acre, besides a considerable quantity that was cut

perty of the Right Honorable Lord Willoughby de Eresby. The land, previously to its being drained and made into a water meadow, was a perfect bog, having been the remains of the old bed of the river Earn. The drainage was accomplished by cutting a new water-course on the south side of the bog; which operation gave an outlet for the drainage of the whole farm.

The expense of levelling the surface of the ground, making the feeders and drains, and building the sluice to admit the water into the meadow, was twenty-four pounds, or about seven pounds per acre. The product of this little experimental field has been far superior, both in quality and quantity, to the tenant's most sanguine expectations, and, by careful management, there can be no doubt that it will be still larger. Another water meadow was made, in 1827, at Inverardran, the property of Alexander Smith, Esq. This meadow lies on the banks of the river Tay, immediately above Loch Dochart, and is watered by Inverardran brook; it contains about eighteen acres. The greater part, before it was drained and watered, was a perfect bog; and even now, in time of high floods, the whole is covered with water; but as that seldom happens except in winter, no injury is done to the crop. It is laid out partly in bed-work and partly in catch-work, at an expense of £7 per acre. The greatest value that could be put on the land previously to its being drained and irrigated, was fifteen shillings per acre per annum. The crop of hay in 1828 was calculated to be four thousand stone, in that district generally worth sixpence per stone, and the aftergrass seven shillings per acre, which will more than pay all expenses in keeping it in repair.*

A water meadow was made in the same year for the Earl of Mansfield at Scone, containing three acres, by means of lifting the turf, levelling the ground into shape, and laying down the turf again.

The crop of hay in 1828 was seven hundred stone of the best quality, besides a good crop of aftermath which was eaten off by sheep. As the supply of water is quite sufficient in all seasons, and the land well sheltered from the winds, there is every reason to expect a much larger return in future.

In 1827, I was employed by Hugh Rose, Esq. of Glastullick, to introduce the system of irrigation on his estates in Ross-shire and Sutherlandshire. On these estates three water meadows are made, and a fourth levelled and formed into bed-work, and sown with grass seeds, for the reception of water in the autumn of 1830. The largest of these meadows is at Dalmore, containing sixteen acres, the greater part composed of sand beds which have been formed by the action of the water, worth only five shillings per acre in its original state. To keep the surface of the ground as nearly as possible in its natural shape, it was necessary to form the beds the same way as the water left it, so that the whole is a specimen of irregular bed and catch-work meadow.

Any quantity of water that is necessary, can be admitted from Alness river by means of a flood-sluice which is erected for that purpose. The water, in time of floods, contains large quantities of peat and other substances, which, in a few years, will form a new surface to the sandy soil.

Arabella meadow, belonging to the same proprietor, and containing three acres, was formed by means of lifting the turf, ploughing and levelling the surface, and laying the turf down again. The third meadow, containing three and a half acres, was, previously to the formation, full of large stones, and the surface very unlevel; the reducing of it to shape was partly by lifting the turf and partly by the plough. The water used for irrigating it is all from springs which rise within the distance of a mile from the meadow; and, although it does not contain a large quantity of sediment, it seldom freezes, which is not the least advantage in irrigation.

Although most of these meadows are formed of the worst soil, yet, by a careful management, they have every appearance of doing well, for the Dalmore meadow already produces two hundred stone of hay per acre; and the advantage alone of the extra supply of manure, from five to six thousand stone of hay yearly, in a country where dung cannot be obtained for money, is not the least.

The late Elliot Lockhart, Esq. M. P. of Cleghorn, Lanarkshire, commenced irrigation some years ago, by means of cutting a few catch-work feeders across the ridges of a field that had been laid down to grass after corn; but the levelling of the surface had been so imperfectly executed, that the water had very little effect.

In 1827, the proprietor was at the expense of lifting the turf, and after having levelled the surface by means of the plough and spade, the turf was laid down again, and new feeders were cut for the equal distribution of the water. The effect of this last improvement has been astonishing, part of the meadow having given, in 1828, the amazing crop of five hundred and forty stone of excellent hay per acre at one cutting, which is the largest crop ever known to have been taken from any water meadow in Britain.* The remainder

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green, and given to the cattle in the house. The whole has been cut twice this season, and I am cutting part a third time. The second and third crops are worth more than what the whole rental of the land was, previous to its being watered. One great advantage of water meadows, is the extra quantity of manure it gives, without receiving any from the farm yard.

I am, Sir,

Your most obedient Servant,

ANDREW SHARP."

*I have been favored with the above communication by Mr. Black, the overseer at Inverardran, wherein he adds—"the crop this year (1828) was all cut in July, and by the 12th of August the whole meadow was covered with an excellent crop of aftermath of the most beautiful color, far surpassing anything of the kind in that part of the country."

*It is a singular fact, but not generally known to agriculturists, that by merely lifting the turf of an old pasture field that is overrun with moss, and by means of ploughing and loosening the sub-soil, and laying down the same turf again, the whole of the moss will disappear the first season, without applying either water or manure to the surface.

gave four hundred stone per acre at one cutting.

At Tarbax, in the same county, there are about twelve acres of water meadow, belonging to Norman Lockhart, Esq., partly bed and partly catch-work. The formation into meadow cost from four to six pounds per acre, the original value of the land per acre of yearly rent was from five to fifteen shillings, and the produce since it was irrigated, one year with another, is from two hundred to two hundred and fifty stone of hay per acre, besides the aftergrass, which is worth as much as keeps the works in repair.

At Cairnmuir, in Peeblesshire, there are two water meadows belonging to John Lawson, Esq.; the one, containing three acres, cost ten pounds in forming; and the other, containing one and a half acres, cost twelve pounds in forming: the former produces, one year with another, hay and grass to the value of thirty pounds, and the latter four hundred stone of hay per acre, besides aftermath, which is generally cut and given green to cattle.

A meadow of three acres, belonging to John Sanderson, Esq., at Romana Bridge End, not worth ten shillings per acre in its original state, has given, one year with another, since being irrigated, a thousand stone of hay, generally worth from fourpence to sixpence per stone.

Among the few farmers who have been particularly interested in promoting the system of irrigation, is James Murray, Esq., at Drochill Castle, Peeblesshire. Although Mr. Murray is only tenant of Drochill Castle farm, he has been at a considerable expense in forming ten acres into regular bed-work water meadow.*

The land was partly bog and partly arable. The boggy part was made into water meadow in 1825, and has produced large crops of hay and aftermath ever since; but the arable part did not receive the water till the autumn of 1827, and even at that time the ground was not properly covered with natural grasses, for which reason, the hay crop of 1828 was comparatively small. But, as the supply of water is abundant and the quality particularly good, even that part, in a few years, will become as productive as the former.

At Glenormiston, the property of William Stuart, Esq., in the same county, there are three water meadows, two of them containing about two acres each, watered by a small brook that runs through the farm yard, whose washings run into the meadows. The third meadow is watered from the Tweed, and contains six acres. The former of these meadows gave, in 1818, upward of four hundred stone of excellent hay per acre, but the latter considerably less, on account of the inferiority of the water and the impossibility of using it, except when at a certain height in the river.

As the land is all very dry, the hay is of a superior quality. What makes these meadows particularly advantageous, is the scarcity of natural hay and the want of manure in the whole district.

In 1827, I was employed to introduce irrigation into Wigtonshire. The largest meadow is at Dalreagle, on the river Bladnock, the property of Sir Alexander Muir Mackenzie, Baronet, containing nearly thirty English acres. It is mostly composed of peat to a considerable depth, and was, until a few years ago, overflowed by the water of the above mentioned river at every flood; to prevent which, the former tenant threw up an embankment round it, and made some partial drains, to free the surface of stagnant water; but as the embankment was never made sufficiently high to ward off the great floods, the improvement was neglected, and, on my arrival in the spring of 1827, the greater part of the bank being destroyed, the land had become boggy.

The first operation was to repair the bank, which cost £140; the next, to make the large conductor from the river to the meadow eight feet wide at bottom, through very hard ground, a distance of nearly half a mile, and build a flood sluice nine feet high, with hewn stone and lime; which operations cost £60.

The making of the feeders and drains, and levelling the surface of the ground, was the next operation, which cost £6 10s. per acre, or whole expense, including the reparation of the bank, £13 per acre. The value of the land previously to these improvements, was from 5s. to 15s. per acre per annum. The hay crop of 1828 was considerable, besides an immense crop of aftermath.

[To be continued.]

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*There is a particular account of this water meadow in the following letter:—

"*Drochill Castle, 24th Jan.* 1829.

"*Dear Sir*—Your letter of the 20th curt. I have been duly favored with, and lose no time in replying to the queries therein contained. I have irrigated, first and last, about ten Scotch acres of land, but as seven of these were only done last year, I can only speak of what I know the other three have produced; these last, as you know, I watered in the year 1825. The land previous to that time was a kind of meadow, and regularly cut every year, (what of it would cut,) but it was very unproductive; the quantity of hay, on an average of years, was, I believe, under a hundred stone per acre, and that of very indifferent quality. Since it has been watered, I conceive it has produced, on an average of the last three years, three hundred tron stone per Scotch acre, and of excellent quality. Perhaps the quantity in the year 1827 was under this a little, but the previous and subsequent years rather above it. I could assign no reason for crop 1827 being less than the other years, unless it arose from cutting the lattermath the year before; and if I am right in my conjecture, I would rather recommend pasturing than cutting of the second crop. I believe my second crop was well worth £1 10s. per acre, fodder that year being uncommonly scarce, which made it the more valuable; at an average of years, however, I could not calculate at above 10s. or 12s. As to the expense of my meadow, I, upon looking into my book, find it stated at £61 19s. for the whole ten acres I have watered, which comes to about £6 4s. per acre. As to my opinion of water meadows in general, it is decidedly favorable; and I would recommend it to every person who has it in his power to make the experiment, and he may rest assured that he will have no cause to regret it if the management be not neglected.

I remain your most obedient Servant,

JAMES MURRAY."

To Mr. George Stephens.

CULTIVATION OF COTTON ON THE PRAIRIE LANDS.

To the Editor of the Farmers' Register.

I think I closed my last letter to you, with urging the necessity of listing the lands intended for cotton the ensuing year. By that thrifty process all the stalks of cotton and corn, and all the offal of them, are placed in a deep furrow immediately under the crop to be grown. A plantation so prepared possesses these advantages:—All that grew on the land, and all its rubbish are placed out of the reach of impeding either hoe or plough in the working of the crop, and in such a position about the roots of the growing plant, that it receives all the benefit of the manure, and it gives a depth of soil immediately under the plant, that ought to make it bear a drought well. It has another advantage: you can plough up and make your beds in any part of the field that your land may be in order, and the rows will all fit to each other when the whole are done. There is yet perhaps, another advantage, though I do not speak of it with confidence—it is, in a great measure, a remedy for the rust. The rust is a disease that is increasing, and has done more injury than any one disease. I will mention three experiments I have made. In 1833, on such parts of the prairie as I suspected rust, I manured with cotton seed, and its effect was only to postpone the time of rusting. Thinking that the quantity used was too little, and its effects too soon gone, I manured the same ground more heavily in 1834, and it did not rust. This year the same lands have been manured again, and parts of the same with stable yard manure, and so far, there is no appearance of rust. I think stable yard and cow-pen manure on cotton, better than cotton seed, so far as a short experience has gone. So I think cotton seed is a better manure for corn. The reason for that fact will be found in the nature of the plant, and the manner of the action of the manure. Cotton seed is the most powerful in its action, and the quickest over in its effects. Corn is rapid in perfecting its grain, so soon as the bearing stage commences—which is at the time it commences to shoot and tassel. From that time, in one month the grain is ripe, and the manure no longer of use to it. Cotton seed is so short lived in its effects, that if it be rotten at the time the corn is planted, it will expend itself in giving growth to the stalk, and will be exhausted before earing. To make it suit the earing time, the seed should be killed after the corn is planted. I know this fact from so many trials that I am sure of it. It is very different with cotton; that bears fruit from the middle of June till frost arrests it, and those manures suit it best which are more slow and more continued in giving off their effects, which I believe to be the case with farm-pen manures, and which I know is not the case with cotton seed in the small quantities in which it is generally used.

On your listed lands you should scatter your manures after it has been lapped with the plough, and when it is ploughed into beds the manure will be generally mixed and incorporated with the earth in and about the centre of the beds. I think it too low when scattered in the furrow before laying the cotton or corn stalks, and also too low when on them before they are lapped. I think light manures will not sink into the earth, but will rise; and indeed that they are subject, like every thing else, to that law of nature which makes what is heaviest go down, and what is lightest, come up. You may scatter your manure in a trench in the tops of the beds after they are made up, but it will not be at so convenient a time, as to work, as before they are ploughed into beds, and it will be more apt to get within the influence of the evaporation of our powerful sun.

Your fields are now all listed; all that grew on them the preceding year has been turned under the earth, in the most suitable situation to secure it from evaporation, and for its beneficial effect on the intended crop. It is all rotting and becoming manure for you, while the winter's frosts are acting with more effect on the soil bared of its covering, and is ameliorating and improving it. Your next step, and that on which your success more depends than on any other, will be to throw your fields into beds so as to *dry* and to *warm* them. This can be well done by the mould-board plough, by breaking up your two first furrows deep and close upon the list, and by opening a deep furrow with a shovel plough in the centre of the old bed, now to be the new alley. This will generally give you all the height of bed wanted, with a little use of the hoe in drawing up in the lowest and wettest places. If your lands are very rolling, they may be dry enough without a bed, but there is no one plantation that lays so as to render them unnecessary in every field. Warmth of soil comes from drying, and drying comes from bedding. The listing should be done in the winter as early as your cotton is gathered, so that the prairie, naturally too loose, should have time to consolidate and become compact. The bedding you will scarcely ever have time to do before spring. I anticipate that some who have never tried listing and bedding, may think that it will make the land more liable to wash off. The prairies are very light and loose, and will wash under any and every circumstance I admit. The lands are equally liable to wash when ploughed, and they are to be ploughed equally whether you bed or not. If you intended to stop the wash in a small gulley in any place, you would either fill it with cotton stalks or bushes, and cover them—and this is what is done by listing, and so as to make each row carry its own water, and surely therefore you will not charge as a cause of washing, the very means you would use to prevent it. I have followed this practice for twenty years without thinking it liable to this objection—though my experience on the prairie is too short to speak with the confidence of knowing it.

Your next step will be to plant. As to the planting and covering, there are numerous ways, and each having some reason for its preference in the nature of the soil and the situation of the land. It would be tedious to enumerate them. I should open trenches on the prairies with an Indigo drill or a short bull-tongue plough, and scatter the seed in the trench, and cover with a board, long enough to rest across two beds at a time, with shafts pinned at right angles on this board, with handles to it like a plough. The mule walks in the alley and covers two drills at a time, and covers from 25 to 30 acres a day. The board covers and presses the earth down in the seed at the will of the ploughman. Where the trees and stumps are numerous, a hand or two must follow and cover near

them. When very wet at the time of planting, your cotton will come well without covering—that is, the rain will coat the seed over for you.

The principal object intended by the bedding, was to dry the land where the seed is put, so as to secure an early rise of the cotton; and though in dry springs you may often get a good rise without bedding; yet it certainly makes it more secure, and the security is worth the additional trouble. I have seen a heavy shower of rain wash the seed up to a great extent, by washing out the gutter or trench in which it was planted, and I have seen it do the same with the plants. Now you are secure against this in a listed and bedded field, and if the alleys wash, as I admit they do, they wash fully to the same extent where you plough and do not bed.

Your cotton being up, there are various ways of tending it, in which good planters differ, though more I think in practice than in principle. I believe all agree in thinking that it is necessary to break up full and deep all the alleys, so as to give loose earth for the plant to push its roots into in search of food, and to lessen the labor to the hoes. That practice then is best, which best answers these ends. With these two objects in view, suppose you try a mould-board plough, and put the left hand or bar side to the plant as near as the list will let you, and throw the earth off, and with its return throw it back, and split out the alley with one cut of a shovel. The alleys will be completely broken, and the space left for the hoe will be so narrow that the hoes will have little to do. The hoes follow the ploughs, and chop through, taking the cotton, the grass, (if any,) and the earth off at one cut, leaving one, two, three, or more stalks in a place, and drawing a hoe full of earth into the same space, which earths the cotton, steadies it, and pushes its growth, and preserves the shape of the bed. The more usual practice here is, to chop through in the same way, but not to draw any earth into the space, or in any way, to the cotton. This is a point of difference between our best, as well as our worst planters. The advocates of one system say that no benefit is done to the plant by earthing it, and that without doing so, they get over more land in the day to the laborer, and can see better whether it has been faithfully done, as nothing is covered. The advocates of the other system assert, that the plant is materially benefited in its growth by having dirt drawn to it—that it is safer from death and from washing up; and though it takes longer, it is not at a time when there is any great press of work. As an advocate, I am incompetent to decide. I shall always put earth to the plant the first time, or while very young, and afterwards, when the press of work comes on, I shall only scrape off, and depend on the plough for the earthing. You see, I think, a good planter may sometimes get himself into a "scrape" without doing wrong.

After the first deep ploughing, the lime in the land becomes slaked by the penetration of the air into it, and also by the rains, and it is kept in so light, loose, and friable a condition, as to need no farther ploughings, except to destroy the weeds and grass that may spring up. Any plough that effects this object does your business, and the *broad sweep* that cuts 20 to 24 inches at a furrow is perhaps the best plough, as three times in a row will clean out the widest. It is a most faithful plough; it cuts every thing, and nothing escapes, and in a dry time in light lands is superior to any plough that I have seen—as it leaves on the surface all that it cuts; it may take root again in rainy spells, and when such set in, it is advisable to change them for mould-board ploughs, which will cover over all that they cut, and more.* This plough is a narrow root, or bull-tongue plough, with two wings 20 to 24 inches long and three and a half wide, standing in such position to it as to resemble the letter A, with the front edge sharp, and the back edge raised 1½ inches high. You can see a plate of a similar one in one of the early numbers of the American Farmer, furnished by Col. John Taylor of Caroline. You must cut off the heel and the snout, and substitute the bull-tongue to suit it to our rooty and stumpy lands.

All the workings of the crop after the first hoeing both for the plough and hoe is merely to kill grass and weeds.

Your working the crop closes when the cotton limbs generally touch each other across the rows, because at that time the working would break the limbs, and there are innumerable roots extending across and filling up the alleys which would injure by being then cut. If you have done faithfully all that is above directed, you have done your duty; the rest you must leave to Him who gives the increase.

I have thus, Mr. Editor, tried to point out to the new settler, and the inexperienced, how he should choose a plantation, and how, having chosen one on the prairie, he should make his winter preparations, so as to continue its fertility, and how to prepare to plant and to tend his crop; on each head I have tried to give him some of the leading reasons why he should do so. I consider it essential to a good planter that he should have a reason for for every thing he is doing, so that, knowing the object he has in view, he will use the means that are best calculated to effect it. Planters differ less in what they intend, than in the use of the instruments with which they effect their intentions. This letter has been spun out to an unreasonable length, and yet I could not be shorter, and say what I had to say.

A PLANTER.

Alabama, August, 1835.

SEA-WEED MANURE.

Fleets of boats, to the number of sixty or seventy, are daily arriving at Galway, with sea-weed for manure, from Cunnamara, Arran, and the county of Clare, which is purchased with avidity, and conveyed on carts all over the country, in various directions, even to the distance of forty or fifty miles into the interior.—*Galway paper.*

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*The mould-board ploughs that suit this purpose best are such as throw their furrow-slice the farthest, as our object is not how fine you can make the land, but how much grass you can cover. The mould-board should be wide, and so bent, as to be more at right angles with the cutting edge, than the usual cast-iron ploughs. They are shaped so as just to turn what they cut with most ease; we want a shape that will throw it far. We finish a row at three cuts that will require five with the ordinary cast-iron plough. The merits of a plough, by the standard of the dynanometer, is in the inverse of its merits for our use.

Extract from the Diary of a Blase.

SPECULATIONS ON THE ANCIENT STATE OF THE EARTH AND ITS INHABITANTS.

Of all collections of natural history, the fossil department is, to me, the most interesting; there is room for speculation and reflection, till the mind is lost in its own wanderings, which I consider one of the greatest delights of existence. We are indebted to the vast comprehensive mind, and indefatigable labor of Cuvier, for the gleams of light which have lately burst upon us, and which have rendered what was before mere speculative supposition, now a source of interesting and anxious investigation, attended with results that are as satisfactory as they are undeniable.

That there was a period when the surface of the earth was almost entirely covered with water —a state between chaos and order, when man was not yet created, (for that then the world had not yet been rendered by the Almighty a fit receptacle for man,) appears to be undoubted. Yet the principle of life had been thrown forth by the Almighty hand, and monsters had been endowed with vitality and with attributes necessary for their existence upon an intermediate world.

These were the many varieties of the Ichthyosauri and the Plesiosauri, of whose remains we have now such abundant specimens—all animals of the lizard species, some supposed to have been supplied with wings, like the flying fish of the present day.

But imagine an animal of the lizard species, one hundred and twenty feet long—imagine such a monster—the existence of which is now proved beyond a cavil, by the remains, deeply imbedded in the hard blue lias rocks, and which are now in our possession. What a terrific monster it must have been! We look with horror at an alligator of twenty or thirty feet, but imagine an animal of that species extending his huge bulk to one hundred and twenty feet. Were they all destroyed when the waters were separated from the land, or did they gradually become extinct when the earth was no longer a suitable habitation for them, and no longer congenial to those properties with which they had been endowed when ordered into existence by the Almighty power? The description of the behemoth by Job, has long been a puzzle to the learned; we have no animal of the present time which will answer to it; but, in many points, this description will answer to what may be supposed would be the appearance, the muscular power, and the habits, of this huge denizen of a former world.

"His force is in the navel of his belly.
He moveth his tail like a cedar.
His bones are as strong pieces of brass.
His bones are like bars of iron.
He lieth under the shady trees in the covert of the reeds and fens.
The shady trees cover him with their shadow.
The willows of the brook compass him about."

It may be a matter of deep surmise, whether all animals were created as we now find them, and whether the first creation was final—how far the unerring Hand will permit a change to take place in the forms and properties of animals, so as to adapt them to their peculiar situations. I would say, whether the Almighty may not have allowed the principle of vitality and life to assume, at various epochs, the form and attributes most congenial to the situation; either by new formation or by change.

May not the monster of former worlds have dwindled down to the alligator of this—the leviathan to the whale? Let us examine whether we have any proofs in existing creation to support this supposition. We all know that the hair of the goat and sheep in the torrid zones will be changed into wool when they are taken to the colder climes, and that the reverse will also take place—we know that the hare and weazel tribes, whose security is increased from their color so nearly approaching to that of the earth in temperate latitudes, have the protection afforded to them when they are found in the regions of snow, by their changing to white—and we know that the *rete mucosum* of the African, enables him to bear the exposure to a tropical sun, which would destroy an European. But this is not sufficient, we must examine further. Sir Humphrey Davy has given us a very interesting account of a small animal, found in the pools of water in the caves in Carniola; this animal is called the *Proteus Anguinus;* it is a species of eel, with two feet; it is only to be found in these caves; it lives in darkness, and exposure to the light destroys it. Now, here is an animal which we must either suppose to have been created at the universal creation—and that is to suppose that these caves and pools of water have also existed from the time of the creation—or that the principle of vitality has been permitted, at a later date, to take that form and those attributes congenial to its situation: it is a curious problem. Again, it is well known that in the continent of New Holland there are animals who have a property peculiar to that continent alone*—that of a pouch or false stomach, to contain their young after their birth; it has been surmised that at one time the major part of that continent was under water, and that this pouch was supplied to them for the safety of their young; nor is this conjecture without strong grounds; if only the kangaroo and opossum tribes, which are animals peculiarly indigenous to that continent, were supplied with this peculiar formation, the conjecture would fall to the ground, as it might fairly be said that this property was only another proof of the endless variety in creation: but the most remarkable fact is, that not only the kangaroo and opossum, animals indigenous and peculiar to that portion of the globe, but that every variety of squirrel, rat, and mouse, which, in every other respect, are of the same species as those found in the other continents, are all of them provided with this peculiar false pouch to contain their young. Why, therefore, should all these have been supplied with it, if not for a cause? And the question now arises, whether at the first creation they had that pouch, or were permitted so far to change their formation, when the pouch became necessary for the preservation and continuation of the species. That these changes are the changes of centuries, I grant, and therefore are not likely to be observed by man, whose records or whose knowledge are not permitted to be handed down beyond a certain extent. Knowledge is not happiness; and when the accumula-

* The captain is out in his natural history; opossums are found elsewhere.—Ed. Port Folio.

tion has arrived to that height so as to render it dangerous, it is swept away by the all-wise and benevolent Creator, and we are permitted to begin again *de novo*. After all, what we term posterity is but a drop of water in the ocean of time.

From Low's Elements of Practical Agriculture.

SUCCESSION OF CROPS.

As crops of the cultivated plants succeed to each other upon the same ground, a question to be determined is the order in which the different kinds should follow each other.

All plants which are cultivated, and which are carried from the ground where they are produced, tend to render the soil less productive, or, in the language of farmers, to exhaust it.

But plants which are suffered to decay, or which are consumed by animals on the ground on which they grow, do not exhaust the soil. On the contrary, the decay of the stems and leaves of such plants, either naturally, or by the consuming of them by animals, tends to add those decomposing organic matters to the soil which form one of the elements of its fertility. This process may be imperceptible and slow, but it is that which Nature herself employs to form the soil, as distinguished from what has been termed the subsoil.

Sometimes this process of decay is counteracted by the singular natural provision, of a conversion of the decomposing vegetables into a substance which itself resists decomposition—peat. But, with this exception, the tendency of the decay of vegetables upon the surface is to add to the fertile matters of the soil.

This is well understood in the practice of agriculturists. When the productive powers of a soil have been exhausted by cultivation and the carrying away of its produce from the surface, it is laid down to herbage, in which state the future vegetation which it produces tends, by its decomposition upon the surface, to renovate the productive powers of the soil. Land in this state is said to rest.

When land, however, has been empoverished by successive crops, and has become full of weeds, the laying it down to rest in that state is attended with less beneficial consequences than when the soil has been previously cleaned of injurious weeds, and fertilized by good culture. In the former case, the process of renovation is slow, if perceptible at all; the useless plants increase, and not those which are beneficial and afford food to pasturing animals. Land, when properly laid down to grass, therefore, tends to recover its wasted powers of production. Land not properly laid down has less of this healing property, and may be more full of weeds and no richer when ploughed up again after a time, than when first laid down. Under good management, however, the laying down of cultivated land to grass and other herbage-plants to be consumed upon the ground, is a mean of resting the soil, and renovating its powers of production; and this mode of recruiting an exhausted soil being always at the command of the farmer, its application is important in practice. It is to be observed also that the poorer soils require this species of rest and renovation more than those which are naturally productive.

The experience of husbandmen from the earliest times has shown, that the same kinds of plants cannot be advantageously cultivated in continued succession. The same or similar species tend to grow feebly, or degenerate, or become more subject to diseases, when cultivated successively upon the same ground; and hence the rule which forms the basis of a system of regular alternation of crops is, that plants of the same or similar species shall not be cultivated in immediate succession; and further, the same rule has been thus far extended, that the same species shall recur at as distant intervals of the course as circumstances will allow.

All herbaceous plants whose produce is carried off the ground which produces them, may be said to exhaust the soil upon which they grow. But all such plants do not exhaust the soil in the same degree; for after some speciesthe soil is seen to be more empoverished than after others.

And not only do different species of plants exhaust the soil in a greater or less degree than others, but the same species does so according to the different period of its growth at which the plant is removed from the ground.

When the herbaceous plant is suffered to mature its seeds, it exhausts the soil more than when it is removed before its seeds are matured. All herbaceous plants, therefore, when cut in their green state, that is, before they have matured their seeds, exhaust the soil less than when they remain until they have ripened their seeds. Thus the turnip, when used in its green state, is one of the least exhausting in the agricultural class of plants to which it belongs; but the turnip, when allowed to remain upon the ground until it has ripened its seeds, is one of the most exhausting plants that is cultivated amongst us; and so it is with the rape and others.

Further, certain plants, by the larger or smaller quantity of manure which the consumption of them affords, are more or less useful in maintaining the fertility of the farm.

When a herbaceous plant is suffered to mature its seeds, and when any part of these seeds is carried off the farm, the plant affords, when consumed by animals, a smaller return of manure to the farm than if the same plant had been cut down before it had matured its seeds, and been in that state consumed by animals. Thus it is with the turnip plant referred to. This plant is with us sown before midsummer. In the first season it forms a napiform root, and puts forth a large system of leaves. Early in the following season it puts forth a long stem, which bears flowers, and the seeds are generally matured about midsummer. If this plant is removed in the first stage of its growth, that is, after it has put forth its large leaves and formed its bulb, and is then consumed by animals, it returns a great quantity of manure; but if it remains until the second state of its growth, then the consumption of its stems and leaves returns scarce any manure. The juices of the root have apparently been exhausted in affording nutrition to the flower-stem, the flowers, and the seeds.

It is beyond a question, that, in order to bring a plant to its entire maturity, by the perfecting of its seeds, a larger quantity of the nutritive matter of the soil is sucked up by it than when it is brought only to its less advanced stages. When crops of plants, therefore, are suffered to arrive at maturity, they are greatly more exhausters of the soil on

which they grow than when they are cut down while they are green; and if those seeds are in whole or in part carried off the farm, the crops are exhausters of the farm, as well as of the ground which had produced them. Were the ripened seeds to be wholly returned to the soil, it may be believed that they might give back to it all the nutritive matter which had been derived from it. But, in practice, seeds are employed for many purposes, and are generally carried off the farm which produces them. When this is done in whole or in part, the plants produced are in an eminent degree exhausters of the farm, as well as of the soil on which they have grown.

Further, certain plants, from their mode of growth and cultivation, are more favorable to the growth of weeds than other plants. The cereal grasses, from growing closely together, and not admitting, or admitting partially, the eradication of weeds, are more favorable to the growth and multiplication of weeds than such plants as the turnip and the potato, which are grown at a considerable distance from each other, and admit of tillage during their growth, and whose broad systems of leaves tend to repress the growth of stranger plants.

Having these principles in view, certain rules may be deduced from them, for the order in which the crops of plants in cultivation in a country shall succeed to each other on the same ground.

1st, Crops consisting of plants of the same or similar species, shall not follow in succession, but shall return at as distant intervals as the case will allow.

2d, Crops consisting of plants whose mode of growth or cultivation tends to the production of weeds, shall not follow in succession.

3d, Crops whose culture admits of the destruction of weeds, shall be cultivated when we cultivate plants which favor the production of weeds. And further, crops whose consumption returns to the soil a sufficient quantity of manure, shall be cultivated at intervals sufficient to maintain or increase the fertility of the farm.

And, 4th, when land is to be laid to grass, this shall be done when the soil is fertile and clean.

These rules may be applied to the plants which form the subject of common cultivation in the fields. In this country, the plants chiefly cultivated on the large scale are—the cereal grasses, chiefly for the farina of their seeds; certain leguminous plants, as the bean and the pea; plants cultivated for their fibres, as the flax and hemp; for their leaves, roots, or tubers, as the turnip, the cabbage, and the potato; and certain leguminous and other plants for forage or herbage. The plants of these different classes are yet to be described; and they are now only referred to with relation to the order in which they may succeed to each other in cultivation.

The 1st class of these plants consists of the cereal grasses. These are chiefly wheat, barley, oats, and partially rye. All these plants are in an eminent degreee exhausters of the farm. They are all suffered to mature their seeds, and are wholly or partially carried away from the farm. Further, from the manner of their growth, and mode of cultivation, they all tend to favor the production of weeds. For these reasons, and on the general principle that plants of the same or similar kinds should not follow in succession, the cereal grasses should not succeed each other, but should be preceded or followed by some crop, which either exhausts the soil less, or admits of a more perfect eradication of weeds.

2d, The leguminous plants cultivated for their seeds, as the bean and the pea, are all exhausters of the soil. They ripen their seeds, and these seeds are for the most part carried off the farm. Some physiologists suppose that they are less exhausters of the soil than the cereal grasses. It is probable that they do exhaust the soil somewhat less than the cereal grasses. But the essential difference between them, when considered with relation to their effect upon the soil, is, that, from their growth, and the manner of cultivating them, they are greatly less favorable to the production of weeds than the cereal grasses. By their broader system of leaves, they tend to stifle the growth of weeds more than the cereal grasses: and further, they admit of tillage during a great part of their growth. This is especially the case with the bean, which is therefore regarded as a useful cleaning crop, and so is cultivated in rotation with the cereal grasses, as a mean of preserving the land clean.

3d, Hemp and flax, which are cultivated chiefly for their fibres, and all plants cultivated for their oils, are exhausters of the soil. They are suffered to form and ripen their seeds and their stems afford no return of manure to the farm.

The next class of plants, from the large return of manures which the consumption of them affords, may be regarded as enriching or restorative crops, in contradistinction to the others, which may be termed exhausting crops:—

1. The turnip, the rape, and other plants of the cabbage genus, cultivated for their roots and leaves, and consumed upon the farm.

2. The potato, the carrot, the parsnip, the beet, and other plants, cultivated for their tubers, and roots, and consumed upon the farm.

3. The leguminous plants—the clover, the tare, the lucerne, and others—when cut green for forage, and consumed upon the farm.

The plants of the latter class, namely the leguminous, when mixed with gramineous, plants, as the rye-grass, are commonly termed the artificial grasses, but would be more correctly termed the cultivated herbage or forage plants. They are often suffered partially to ripen their seeds, and are made into hay; and in this case they follow the general law, exhausting the soil more than when used green. And when the hay-crop is carried away from the farm, they are to be regarded as exhausting rather than restorative crops.

In speaking of these different classes of plants, the following terms may be employed:—

1. The cereal grasses may be termed corn-crops.

2. The leguminous plants cultivated for their seeds, pulse crops.

3. The turnip, and other plants of the same kind, cultivated for their roots and leaves, may, with reference to the mode of consuming them, be termed green crops; or, with reference to the manner of preparing the ground for them, fallow-crops.

4. The potato, and plants of other familes cultivated for their roots and tubers, may in like manner, be termed green or fallow crops.

5. The leguminous plants cultivated for green food, as the lucerne and tare, may be termed green forage-crops.

And, lastly, the mixture of gramineous and leguminous plants cultivated for herbage or green feed, may, in compliance with common language, be still termed the sown or artificial grasses.

Further distinguishing these different classes of crops according to their effects upon the fertility of the farm, they might be divided thus:

1. Corn-crops—exhausting crops, and favorers of weeds.
2. Pulse-crops—exhausting.but cleaning crops, or capable of being rendered so.
3. Green or fallow-crops—restorative and cleaning crops.
4. Green forage crops—restorative, and sometimes cleaning crops.
5. The sown grasses—restorative crops.

Knowing these the general characters of the cultivated plants, we have, in devising a rotation, to cause the restorative and cleaning crops so to alternate with the exhausting crops, as that the land may be preserved fertile and clean. Further when we find that land cannot be sufficiently cleaned by means of cleaning crops, we must make use of the summer fallow; and again, when we find that land requires rest, we may lay it down to grass for a longer or shorter time, taking care when this is done that the land shall be in as fertile a state as circumstances will allow, and free of weeds.

Extract from the New York Farmer.

CLEAN WHEAT CATCHING THE DISEASE OF SMUT.

"A neighbor of mine, having purchased some very excellent seed wheat, the same was delivered in the farmer's bags of whom he had bought the wheat, with a promise that he, the purchaser, would return the bags immediately after the grain was sown or deposited in the drill. My neighbor complied with this request, and having drilled about half the quantity, from those bags in which he had received the wheat, he took opportunity on the following day, which day had been very wet and unfavorable for drilling the remainder, to empty those bags, in order that they might be returned. Thus was this excellent, clean, and till then unadulterated seed wheat, put into his (the purchaser's) own bags, which before had contained some very foul and *diseased smutty wheat*, as he, together with his farm servants, acknowledged the fact. On the third day the remainder of the wheat was drilled on the same soil, and in the same field, but not from the *clean bags* of the seller of the seed wheat.

"Now, mark the result at harvest. The clean seed wheat, which had been emptied into the farmer's own filthy smutty bags, produced about *one twentieth part of smutty ears;* whereas, from the former day's drilling, not a *single ear* of smutty wheat could be found."

For the Farmers' Register.

VIEW OF PART OF YORK, AND THE BACK RIVER LANDS.

The lands of York county, along the main road from Williamsburg, present a very general appearance of bad farming, and neglect of the valuable and abundant resources for improving the soil and increasing its products. There are some exceptions, particularly the farm of Judge Semple, near Williamsburg, on which much marl has been used, and most beneficially, as well as other manures. The road, as in most other cases in lower Virginia, is kept generally on the ridge between rivers or smaller streams, and of course, on land poorer than the average. There are farms on and near York River, of most excellent soil, and some improved to a high state of productiveness, and well cultivated. These however, are not in view on this route. Above Yorktown, the lands seen are mostly undulating: farther on they become more and more level, and in the lower part of the county, the surface is mostly so flat that it is objectionable, on account of not permitting the excess of rain water to flow off with sufficient facility. I was not enough acquainted with the country to know how much of it has marl beds of easy access: but it is certainly well supplied at several different parts along the road—yet there is for 20 miles the same general, indeed, almost total neglect and disuse of this manure. The character of their cultivation is such as might be expected from the disregard of the improvement of the soil. No where in our country can be found such valuable and cheap resources for improvement, and sure means for agricultural profits, combined with such general neglect of them.

In the vacant lots of Yorktown, and in the outskirts, I noticed a weed which was to me quite new, and which, from being confined within such narrow limits, seems to have been brought from abroad. It is of the thistle family, grows from one to two feet high, and has a flower of a brilliant and beautiful yellow color. The flower stands singly, and is more than an inch across. The leaves of the plant are shaped much like those of the common thistle, or the artichoke, armed with thorns at every point. The seed-pod is also covered with points. I learned that it is also found on the other side of the river, on Gloucester Point.

As flat as the lands are below, there seems to be almost no use made of bedding and water-furrowing, without which such land cannot possibly be kept dry. Extensive swamps are visible on both sides of the road, at some distance, which have been neither cleared nor drained, nor any attempt made (as was stated) to derive a profit from them, except by cutting out the best oak trees, to furnish timber to the neighboring fortifications, and for the navy yard at Portsmouth—which business has been very profitable in this low country. These swamp lands are rich, and not subject to any except surface water, with which they are soaked, and more or less covered in winter—and might be very easily and perfectly drained.

It appeared as a striking illustration of the general apathy of the people, and of the small desire for any means of deriving information, that not one post office was on this main mail route for the 24 miles between Yorktown and Hampton—nor did I see the stage driver throw out for any one in this distance, a way newspaper, or other periodical. Perhaps they are not worse off, for this privation, than other parts of the country where political newspapers are taken generally, and almost exclusively. By shutting out both the light and the darkness—the truth and the falsehood—which the

party presses furnish—there is at least as much gained as lost.

For my accommodation, the stage took a different road for the last nine miles before reaching Hampton, which passes through the remarkable and valuable body of lands lying on and near Back River. I devoted parts of two days to an examination of this very interesting region, and receiving information of its character and mode of tillage, in the company of an old friend who is a successful and enlightened cultivator there, and whose opinions deserve great respect. This gentleman, Col. John Pryor, has promised me to prepare, and communicate to the Farmer's Register, a full and minute report on the Back River lands, if not of the whole of the little county to which they belong. My memoranda therefore of this remarkable and interesting region will be very concise, and present merely observations on such matters as are striking to a stranger, and might perhaps be passed over without notice by an old resident—or otherwise will consist of such "shreds and patches" of facts and opinions as might be deemed by others not worth distinct notice, or the trouble of being recorded. It is my object in these hasty memoranda, to note trivial matters—to present the mere *gleanings* of more important and valuable harvests which other writers either have before given to the public, or have ready secured in their minds, and *may* communicate for the public benefit.

The stranger will be first struck with the remarkable level surface of the whole body of Back River lands. They have but a few feet of elevation above the highest storm-tides—and on such occasions, much of the land is covered, which is firm and dry generally. This of course is a strong general objection, and cause of much injury to the lands which are sometimes inundated. The natural fertility of the whole body (of about 8000 acres) is great, and its permanency is abundantly proved by the wretched and scourging tillage which has been heretofore general, and still is practiced on most of the farms. The papaw, which is unknown in the high conntry, except on spots of rare fertility, or on the rich western lands, is here a common growth, seen in almost every waste spot. Though water may be reached by digging three feet in most places, and stands in the wells at only eight or ten feet below the surface, there is no difficulty in draining on account of springs. Surface or rain water is all that is to be guarded against, and the proper system of draining required, is simple and cheap. It consists in putting all the land in beds with a proper direction for their water furrows to be emptied in the ditches which are in the lowest places. The long and narrow bottoms, or slight depressions by which the storm-tides penetrate for great distances through the land, furnish admirable sites for these ditches, and great facilities for digging and keeping them open.

The soil is of three kinds, which are distinguished as the gray land, the black, and the brown or chocolate colored. The first is the most elevated and the least fertile—and the last is the most valued. It would be difficult to find any land richer than either of the two last kinds—and scarcely any more productive, when well cultivated, and in good seasons. But the low and level surface, the close neighborhood of water below, and probably other circumstances, cause more hazard here, and make the prospects of the farmer less sure than on some much less fertile soils. Corn is here the great crop—the most sure and the most productive. The soil (especially the brown) is very good for wheat also, being generally stiff enough—but the various disasters to which that crop is subject, render it much less sure and profitable. All the land is much mixed with gravel, and much of it below the surface has a quantity of rounded stones of various sizes, such as are seen on the river shores in the higher country. In one place, soon after entering this county, the surface of the road appeared much like that of a paved street, from the uniform cover of imbedded stones, about the size of those used for paving.

Below the surface, at various depths between two and eight feet, a bed of shell marl is so generally reached, as to be supposed to be almost the universal substratum of the Back River lands. This is a remarkable and important fact, if true—and may serve to account for the great fertility of the surface. The marl is nearest the surface of the brown and black soil—generally there within three feet, and often less. In whatever manner the surface earth was deposited by natural operations, and however poor it might have been originally, every tree which grew, must necessarily have pierced the marl with its roots, and brought up calcareous matter to form part of its body. All these trees require more or less lime—and all obtain some, as is proved by the contents of their ashes. For pines, the smallest supply of lime will suffice, and the presence of more is decidedly injurious—while the wild locust, the papaw, and some others cannot thrive except where the supply of lime is abundant. But every tree must draw up more or less—and when it dies and returns to the earth again its entire substance, all the lime which it had received is left on, and is ultimately mixed with the surface soil: and if the abundance and vicinity of the lime below offers an unlimited supply, this natural process must continue until the soil is as calcareous as is necessary, and as rich as that quality and putrescent matter in abundance will, together, certainly cause any soil to be. It may be objected to this reasoning, that the same process would have gone on wherever marl lies within reach of the deepest roots of trees—and that all the soil lying above should be thereby made rich, instead of exhibiting the natural sterility of most of such land higher up the country. The same effect is produced in many cases, and perhaps in every case where there is no barrier of barren subsoil between the surface and the marl. But where this barrier is found, as it generally is, and of from two to more than ten feet thick, it effectually stops the descent of the roots of such trees as delight in a calcareous soil—and those of pines, and other trees of like character in this respect, would not dip into the shelly earth below.

Black or native mulberry is a very common forest growth here, and on a field which had been cleared, (the second time) a few years ago, many young mulberry trees were left, to serve for fencing timber. Some of these are now entirely dead, and all the others in a dying or declining state. From this it would appear that the shelter of other trees, or a thick growth of their own kind, is best for their healthy growth. The fact is

worth the notice of those who design to raise mulberry trees for silk worms.

Col. Pryor's crop of corn was planted entirely with seed of the "twin" or "prolific corn" obtained from Maryland, and of which, accounts have been given in Vol. 2 of the Farmer's Register, both by Mr. Carmichael and Mr. Garnett. Though planted late, it was then, (on July 8th) throwing out shoots, and sometimes showing three and four shoots to the stalk. On a newly cleared part of the same field, the planting was finished as late as June 23d—and in the rows which were planted a few days earlier (supposed June 20th) some plants were as high as my breast, when the leaves were raised. This remarkable luxuriance was however not owing to the kind of corn, but to the richness of the black soil.

The general opinion which I formed from my slight and hurried view, and the information gained during the same time in conversation, was, that there is no body of land in Virginia richer than this, or more capable of rewarding the outlay of capital and the judicious labors of the cultivators. But the general management, though greatly improved within fifteen years, and still improving, is yet very bad: and the labor which such soil would require, if judiciously managed, is made heavier by neglect, and its rewards diminished in proportion. Some of the best land (not under tillage) might have been bought not very long ago, under $10—and perhaps some such might still be found as low. A large proportion still remains to be cleared and drained—and a general operation of this kind, directed on a proper plan, and by combined effort, would greatly enhance the value of the land already under tillage. There is great disproportion in the prices of the land under cultivation, and such as is not cleared. The farm of Thomas Jones, esq., which is all cleared, and has no fencing timber, and scarcely any wood for fuel, was lately bought by him at $30 the acre—and though without buildings of much value, is certainly low at that price, though it is the highest yet given for any Back River land.

But however rich these lands are, and however much the labor of tillage might be lessened, and the general products increased, by better farming, there are two great objections to the country—in the swarms of mosquitoes which infest every cornfield and thicket through the day as well as night—and in the bad quality of the water furnished by all the wells: but neither of these evils appear to me to be past remedy. When the remaining waste and swampy woodland shall have been cleared, and the whole country drained as well as it is capable of, and as even regard to economy in labor would direct to be done, the mosquitoes will in a great measure disappear here, as has happened elsewhere from like changes. As to the water, there is no hope for improvement except by one means—and that holds out such promise of success, that it is strange that no where in all this low country, neither in the towns or country, the trial has been yet fairly made. I refer to the obtaining pure water by boring to great depths, as has been so extensively and successfully practised in Alabama, as well as in various parts of Europe. To the owner of every farm of 300 acres on Back River, an Artesian well of pure overflowing water would be a cheap purchase at $500—and to such a town as Norfolk, it would be well worth fifty times that sum. In Norfolk the experiment was commenced, but with means and arrangements so insufficient, that the boring was not carried deeper than 150 feet. If I were an inhabitant of the place, I would gladly pay my share of the expense of penetrating to 800 feet, if that depth should be found necessary. The experiment might fail, it is true, after incurring every expense: but none is better worth the risk. If it succeeded in any one place, it would show that the same valuable object might be effected any where in all the low country of Virginia, and perhaps of adjacent states. Even the Fortress is not supplied with well-water fit to drink, and resort is had there, as in Norfolk, to rain water collected in tanks. While the means proposed for procuring pure water are neglected in rich and populous towns, and in fortifications where the treasure of the nation is lavished for every thing else, it would be idle and ridiculous to expect the effort to be made by scattered individuals. But even in their situation, there is abundant inducement for a number to unite to bear the expense of a single experiment, the result of which would show what each one might venture for his own benefit.

To these two great evils of the Back River lands, I have not added the usual charge of unhealthiness, because it does not seem to be well founded, or more so than belongs to all our tide-water country. Whatever liability there is to bilious disorders would be removed in a great measure by a general and judicious system of clearing, draining and tillage. The country would be, no doubt, unhealthy at first (and even dangerous in autumn,) for new settlers from the upper country—but it seems quite the reverse for those who reside here.

There are particular as well as general causes, which it would be out of place here to treat of, which have concurred to depress this fine country—for which nature has done so much, and man has done so little. But, though slowly, there is a beneficial change now going on, caused by capital and cultivators being attracted from other places, as well as by increasing attention to improvement being every year given by old residents.

There is no part of Virginia where the repeal of our present law of enclosures, or change of state policy in that matter, is more necessary than on Back River—and the land holders with whom I conversed were fully impressed with that truth. Yet, as an illustration of the listlessness of the people of Virginia, not one here aided in any of the several movements for relief made in the last session of the General Assembly.

A GLEANER.

July 10th, 1835.

From the Silk Culturist.

CULTURE OF THE MULBERRY.

Eastwood, near Fredericksburg, Va.

SIR:—I feel deeply interested in the success of the silk business, particularly as regards this State, and beg leave to suggest to you the propriety of making a statement of facts, which I think would arouse the most indifferent.

I believe no statement in your paper has placed

the net profit of an acre of land, well set in grown mulberry trees, at less than $100 per annum, and some writer has put it at $300. Now, can this be shown conclusively—or, in other words, are any of your various companies prepared to rent or purchase lands, well set in grown or five years old trees, at any thing like the above prices? If these queries can be answered in the affirmative, hundreds of our citizens who are now forcing their lands into market, to move west, at from $5 to $7 per acre, would be induced to remain and cultivate silk.

There is no agricultural staple in the world, as little liable to fluctuation in price, as *silk*. It will be at least fifty years before we can supply the home demand; and England must ever be an importer to an immense amount.

Now, sir, let me state one more fact, in regard to the *net profit* per acre *per annum*, in this State, of cultivated land. It is less than $6, and I am fully prepared to prove it.

Very respectfully,

J. B. GRAY.

P. S. I myself have gone largely in the business.

SOME ACCOUNT OF THE WILD HORSES OF THE SEA ISLANDS OF VIRGINIA AND MARYLAND.

Pharsalia, (Accomac,) 30th July, 1835.

To the Editor of the Farmers' Register.

Your favor of the 20th inst. I did not receive until nine days after its date, and during a period of considerable engagement. You will do me only justice, by attributing the tardiness of the reply to these causes, rather than indifference to your wishes. No enterprize, of a temporal nature, more deeply enlists my feelings, than the improvement of the agriculture of Eastern Virginia, and particularly of this interesting section of the state; and the man of science who voluntarily devotes his labor and talents to the accomplishment of an object so important to the best interests of our country, I would honor as an illustrious benefactor. The Eastern Shore of Virginia possesses physical advantages to the agriculturist and man of taste, rarely united in any other portion of the earth. Its climate is in bad repute abroad, and I regret my inability to give my testimony in favor of its salubrity. But the autumnal bilious, remittent, and intermittent fevers of our peninsula, depend upon causes, perfectly under the control of human skill and industry; and the period will come, when its general health will equal that of any other country in the same latitude. The inflammatory diseases of our spring and winter, are comparatively mild; and pulmonary and thoracick affections more rare than in any other more northern portion of the United States. There are more cases of coughs and dangerous colds, terminating in fatal consumptions, in one village of our northern and eastern states, in a single winter month, than occur in the dense population of our two peninsular counties in a whole year. While marshes and low grounds can be drained, the Eastern Shore has no reason to despair of a pure atmosphere; but industry must be excited into activity to accomplish so desirable an object. The marshes of Italy, and particularly in the vicinity of Rome and Naples, though exposed to a hotter sun, have injured the health of those populous cities but little, until within the last few years, when they have been neglected.

That the health of this shore is susceptible of immense improvement, my own experience furnishes abundant evidence. The gentleman who owned the farm on which I have resided for nearly twenty-four years, was forced to leave it, and seek a healthier situation. Every member of his family had been attacked with a dangerous grade of bilious fever, in August and September—and vernal intermittents—that surest proof of miasmatic poison, and a sickly situation—were frequent. This did not deter me from a purchase; for the source of this terrible contamination, I soon discovered, and instantly applied the remedy. I drained two pretty extensive ponds of half stagnant water, near the homestead, and half a hundred others more remote, as soon as I was able: and the consequence was, that during the whole period of my residence here, with a numerous family, not one case of spring intermittent has ever occurred, and but few fevers of any kind, and those yielding readily to the gentlest remedies.

But I am travelling, inadvertently, from the more immediate subject of your letter. If your agricultural work obtained a wider circulation here—to which it has the highest claims—I might occasionally offer some hints, that your superior judgement could improve, in a way to add to its merited popularity. Permit me to assure you, that I would, at any time, be highly gratified with an opportunity of furnishing a column or two of pleasant or useful matter for your interesting and patriotic journal; but the subject to which you have invited attention, will, I fear, disappoint my wishes.

The florid description which you have recently received of "wild horses" and "horse pennings" upon our Atlantic islands, was better suited to what they were thirty years ago—and indeed, before my knowledge of Virginia—than to their present appearance. The horses have been gradually diminishing in number, by neglect, until on one island, they are nearly extinct; and the rustic splendor, the crowds, and wild festivity of the Assateague horse-pennings, scarcely retain a shadow of their ancient glory. The multitudes of both sexes that formerly attended those occasions of festal mirth, were astonishing. The adjoining islands were literally emptied of their simple and frolic-loving inhabitants, and the peninsula itself contributed to swell the crowd, for fifty miles above and below the point of meeting. All the beauty and fashion of a certain order of the female population, who had funds, or favorites to command a passage, were sure to be there. All who loved wild adventure—whose hearts danced at the prospect of a distant water excursion, and a scene of no ordinary revel, where the ocean rolled his billows almost to their feet; all who had a new gown to show, or a pretty face to exhibit, who could dance well, or sing; belles that sighed for beaux, and beaux that wanted sweethearts; all who loved to kiss, or to be kissed, to caress, or be caressed; all, in short, whose hearts delighted in romance, without knowing its name, hurried away to this anxiously expected scene of extrava-

gant jollity, on the narrow thread of beach that the ocean seemed, every moment, threatening to usurp. You can scarcely imagine, sir, the extravagant enthusiasm with which this exciting sport was anticipated and enjoyed. It was a frantic carnival, without its debauchery. The young of both sexes, had their imaginations inflamed by the poetical narratives of their mothers and maiden aunts, who in their more juvenile days were wont to grace those sylvan fetes, of the mad flight of wild horses careering away along a narrow, naked, level sand-beach at the top of their speed, with manes and tails waving in the wind before a company of mounted men, upon the fleetest steeds, shouting and hallowing in the wildest notes of triumph, and forcing the affrighted animals into the angular pen of pine logs, prepared to enclose them: and then the deafening peals of loud hurras from the thousand half-frenzied spectators, crowding into a solid mass around the enclosure, to behold the beautiful wild horse, in all his native vigor subdued by man, panting in the toils, and furious with heat, rage and fright; or hear the clamorous triumphs of the adventurous riders, each of whom had performed more than one miracle of equestrian skill on that day of glorious daring—and the less discordant neighing of colts that had lost their mothers, and mothers that had lost their colts in the *melee* of the sweeping drive, with the maddened snorts and whinnying of the whole gang—all, all together, formed a scene of unrivalled noise, uproar and excitement, which few can imagine who had not witnessed it, and none can adequately describe.

But the play of spirits ended not here. The booths were soon filled, and loads of substantial provision were opened, and fish and water fowl, secured for the occasion, were fried and barbacued by hundreds, for appetites whetted to marvellous keenness by early rising, a scanty breakfast, exercise and sea air. The runlets of water and the jugs of more exhilerating liquor, were lightened of their burden. Then softer joys succeeded: and music and the dance, and love and courtship, held their undisputed empire until deep in the night, when all sought shelter and repose on board of their boats, moored by the shore, or among their island friends, who gladly entertained them with characteristic hospitality. Many a winter evening's tale did the incidents of those merry-making occasions supply, and many a peaceful young bosom of retired rural beauty was assailed with other emotions than the rough sports of an Assateague horse-penning inspired; and from one anniversary of this half-savage festivity to another, all was talk of the joys and transports of the past, and anticipations of the future.

In regard to the origin of the race of our insular horses, there is no specific difference between them and those of the main land; the smaller size and superior hardihood of the former are entirely accidental, produced by penury of sustenance through the winter, occasional scarcity of water, continual exposure to the inclemency of the seasons, and the careless practice of permitting promiscuous copulation among them, without regard to quality. With respect to the supposed resemblance, on which you remarked in your letter, these horses are, in general, neither so sure-footed or hardy, or small, or active, as the famous Shetland pony; nor are their hoofs so well formed, although there are to be found among them numerous exceptions to this remark. All this may be readily accounted for from the operation of physical agents, the difference of climate, better water, long winters, and the localities of the soil on which they subsist. The interior of Shetland is mountainous and boggy, and abounding with wholesome water; and the more nutritive grass of the rugged mountains, inviting the little animals to feed principally upon those rough grounds, during their short summers, and occasionally in the latter part of spring and beginning of autumn, impart greater vigor and activity to their systems, and give them, doubtless, better feet. Assateague and Chincoteague islands are flat, sandy and soft, producing abundance of excellent grass, upon which they become very fat during the summer and autumn, notwithstanding the annoyance of flies, with which those islands frequently abound. But horses and cattle suffer for good water in dry summers and hard winters. Having no springs of running water, the animals which the islands support, depend for their drink upon ponds and glades, or small excavations made for the purpose, which are filled by the rains. These soon become putrid in our burning sun, are often dry in the summer, and freeze over in the winter, so as seriously to injure the suffering creatures, that have no other resource for this indispensable article. All this might be easily remedied by a little care and trouble; but insular habits are at enmity with systematic labor, or provident industry. Fishing, and shooting, and oystering, which yield immediate profit or subsistence, agree better with their indolent, temporary habits of living, whilst the slower and more remotely profitable processes of agriculture, or rearing stock, are considered as servile drudgery.

The horses of Assateague island belonged principally to a company, most of whom resided upon the peninsula. No other care of them was required, than to brand and castrate the colts, and dispose of the marketable horses, all of which was effected at the period of their annual pennings, (June,) the whole, nearly, being joint stock. Their winter subsistence was supplied abundantly by nature. The tall, dense, and heavy grass of the rich flat lands, affording them green food nearly the whole winter, the tops of which alone were killed by the frosts, mild, as usual, so near the ocean. They never suffered for provender, except in very deep snows, with a crust upon the top, or when high tides were immediately succeeded by intense cold, which covered the marsh pastures with ice, both of which accidents were of rare occurrence, and very transient in their duration. Once or twice since my residence here (24 years,) the loose and spongy ice, formed from salt water, either lay so long as to injure the grass, or it was so entangled with the ice, that upon being suddenly carried off by a second north-easter before it had melted, it swept away, in its broken fragments, much of the food upon which the animals depended for their support. But I never heard that the scarcity thus produced, had any other effect than to reduce their flesh: no deaths occurred from that cause.

The wild gang of Assateague horses were secured by driving them into pens, made for the purpose, of pine logs. The horses seized in the pens, (by islanders accustomed to such adventures, who pushed fearlessly into the midst of the crowded herd,) were brought to the main land in scows,

and immediately backed, and broke to use; their wild, and apparently indomitable spirit deserting them after being haltered and once thrown, and subdued by man. More docile and tractable creatures could not be found.

The price of these horses has been greatly enhanced of late. Thirty to forty dollars were estimated high prices, until within the last few years; some may still be obtained at these prices, but not of best quality—and at a sale of part of a joint stock, a few weeks ago, on an adjoining smaller island, (Morris',) several horses, that from some peculiarity of food, or better water, or superior and more recent origin—the latter I believe the efficient cause—had attained a larger size and more elegant shape, were sold upon the spot as high as from 60 to 70 dollars each. A considerable number may still be purchased on the islands—and some tolerably handsome—at prices varying between 30 and 45 dollars. I saw this week a beautiful little animal just bought by a gentleman from Jersey, at the latter price. The only peculiarity I have ever observed in these animals, is their predilection for salt marsh grass, which never deserts them, however long they may live, and however early they may be removed from their native pastures.

The catastrophe you allude to, did occur on Chincoteague island, of horses rushing into the sound, when indiscreetly attempted to be caught without pens, by driving detached portions of them upon narrow, projecting marshes; and some fine creatures were drowned. The practice is now abandoned.

I am perfectly assured that a small capital might be most profitably employed, by a man of enterprize, in horses, black cattle and sheep, upon these islands, if one careful herdsman could be procured. Pasture lands are extremely low. Since I have disposed of my real estate in Virginia, preparatory to a removal north, I have sold 200 acres of first-rate pasture land—part arable, a portion of a large body which I own upon the northern end of Chincoteague island, and affording the principal winter subsistence for the stock of the island—at 100 cents per acre. The remainder is still unsold. The largest and finest work-steers of the Eastern Shore, are raised upon these islands, without any expenditure for winter support; a proof that horses of full size, might also be reared there, with judicious attention to the breed, proper selection of stallions, and care to provide water. No other attention is necessary, except to watch the winds and weather about the periods of the equinoxes, when desolating tides are threatened, and to drive the stock upon high grounds, secure against inundation. Drovers from the North, purchase their cattle, and their horses always command a good price in the neighborhood. They are hardy, rarely affected with the diseases to which the horse is subject, perform a great deal of labor, if proportioned to their strength, require much less grain than common horses, live long, and are, many of them, delightful for the saddle. I have a beautiful island pony, who for fifteen years has been my riding nag in the neighborhood and upon the farm, who has given to my daughters their first lessons in equestrian exercise, and has carried us all many thousands of miles in pleasure and safety, without having once tripped or stumbled; and he is now as elastic in his gait, and juvenile in his appearance, as he was the first day I backed him, and is fatter than any horse I own, though his labor is equal, with less than two-thirds of their grain consumption. His eye still retains its good natured animation, and to one unskilled in the indications of a horse's teeth, he would pass readily for six or seven years old. My regrets at parting with this noble little animal, are those of the friend.

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Chincoteague island contains upwards of seventy families. One-third of their bread corn is raised upon the island; and the productions of the water, and occasional profits from disasters at sea, afford them an ample support. Assateague, though containing three or four times as many acres as Chincoteague, has but few inhabitants. It is unfit for the cultivation of corn, and has but little wood. Its rich, bent-growing lands, are subject to inundation during spring tides. The scenery around certain localities upon Chincoteague, are inexpressibly sublime and beautiful; and the view of the ocean and surrounding clusters of islands from the elevated sand hills of Assateague, directly opposite my house, would enchant you. To give you some faint idea of the extent of surface upon the two principal islands near me, I will just say, that Chincoteague is perhaps seven or eight miles in length, narrow at the two ends, and gradually widening in the middle to two or two and a half miles. Assateague is vastly larger. Nothing but the total prostration of all enterprize among us has kept these islands in their present unprofitable condition. Some hundreds of horses, cattle, and sheep, might be raised here, and annually sold, without one dollar of cost, except the expense of herdsmen, whose whole care and supervision would be confined to two or three objects—a supply of water—to drive the stock to high grounds when violent north-easters were threatened—(of the approach of which, sufficient premonitions are always given—) and to attend to the branding and castration of the young stock, at the periodical June pennings. The Hebrides of Scotland, so profitable to their proprietors, do not possess the one-hundredth part of the advantages of our Atlantic islands, for all the purposes of comfortable living and extensive stock raising; and yet they are stupidly neglected.

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T. HOLMES.

SPECULATIONS ON THE NATURE AND FERTILIZING PROPERTIES OF THE EARTH CALLED "JERSEY MARL," OR "GREEN SAND."

To the Editor of the Farmer's Register.

The contributions to your Register by Professor Rogers, on the green sand of New Jersey and Virginia, have afforded me, and I doubt not a large portion of your readers, much pleasure and instruction. It is gratifying to see men of science, thus bringing the stores of their learning to the aid of the practical concerns of life. By pursuing this course, they not only confer great and lasting benefits on mankind, but afford themselves the finest opportunity of gratifying an honorable ambition, by the almost indefinite extension of the sphere of their reputation and usefulness. A chemist may toil for years in his laboratory, wasting his life over his crucibles and retorts, and die and

be forgotten. Or if perchance, he strikes out some new discovery, his name may be recorded in the annals of the science, and recited annually by professors in their introductory lectures; but so far as the great world of mankind is concerned, he is yet utterly unknown to fame. But let him once turn his attention to practical affairs—be no longer a man of speculation, but of action—and how soon the obscure philosopher is converted into a prominent public benefactor. His fame, no longer confined to mere men of science, in this reading age soon pervades society, and becomes emphatically *popular*. Why else is it that the scientific fame of Franklin and Davy is so much more extensively diffused than that of Priestly, Cavendish, Lavoisier and others, who, equally eminent among men of science, have yet failed to make any impression on the popular mind? The lightning rod of Franklin, and the safety lamp and *Agricultural Chemistry* of Davy, have so connected them with the common affairs of life, that they can never be forgotten; and each of them may be said with truth to have erected for himself a monument more durable than brass. The agricultural community has reason to congratulate itself that these splendid examples are not likely to be lost on the zealous and indefatigable professor of chemistry in the University of William and Mary.

Connected with the subject of the green sand formation, there is a most interesting inquiry but slightly noticed by Professor Rogers, to which my attention has been frequently turned, and of which I have yet seen no satisfactory solution. I allude to the remarkable fact, almost universally observed, of the disappearance of calcareous matter near the surface of our marl beds. I propose in this communication to offer some conjectures on the causes and effects, in an agricultural point of view, of the chemical changes which this deposite has evidently undergone.

So far as my information extends, this fact is always observed near the surface of beds of *blue marl*. The upper stratum consists invariably of what at first sight appears to be blue clay, but when more nearly examined is found to be composed principally of a silicious substance, through which are interspersed distinct impressions of shells, and numerous shining particles, (according to Professor Rogers) of *mica*, but which I take to be *selenite* or *pure gypsum*. I have occasionally found in these beds what at first appeared to be an actual shell fish, with both shells and the hinge seemingly perfect; yet so entirely destroyed was the hard substance of which it was originally composed, that it would yield to the slightest touch, and the application of the strongest acids could not detect the presence of the least portion of the carbonate of lime. What has become of this calcareous matter? This is an inquiry equally interesting to the geologist, and to the agriculturist, and it is surprising that no satisfactory solution of it has yet been given, or even attempted. In your *Essay on Calcareous Manures*, second edition, page 49, speaking of a deposite which had once been a bed of fossil shells, you say: "Not the smallest portion of calcareous earth can be found —and the gypsum into which it must have been changed, (by meeting with sulphuric acid or sulphuret of iron) has also disappeared in most places," &c.—and Professor Rogers in his article re-published in the Appendix to the Essay on Calcareous Manures, uses the following language: "Besides a considerable proportion of green sand, it contains, in addition to the crystalized gypsum, a notable amount of this substance in a sub-divided state, and seemingly occupying the place of the shells, which were formerly present, and have been decomposed under *the chemical agency of some substance which filtrated in solution through the mass*"—(page 115.) In the article on gypseous earth published by you in the Register as early as September 1833, the fact of the disappearance of calcareous matter from beds formerly composed of fossil shells is mentioned, and the difficulty of its explanation very clearly stated. That *sulphuric* acid is the agent in effecting this remarkable change, there can be no doubt; but whence is it derived? And what new combinations have been formed? These questions are not suggested by a mere spirit of speculative curiosity, but are of high practical importance, inasmuch as upon their solution depend the chemical character of this substance and its value, as a fertilizing agent, to the agricultural community.

In prosecuting this inquiry, I shall proceed on the supposition that the beds of *gunpowder marl* of New Jersey, containing the green sand, are similar to our beds of blue marl in Virginia; the descriptions given by Professor Rogers of the New Jersey deposites agreeing precisely with those that I have examined in Virginia. I take it for granted, also, that no accurate analysis has been made (because none is reported) of the substance called *gunpowder marl*, the analysis of Professor Rogers having been confined to one of its ingredients, the *green sand*.

The following theory, which I offer without any great degree of confidence in its correctness, is at least not destitute of plausibility, and is certainly strongly sustained by some striking facts connected with this deposite. Suppose the presence of *sulphuretted hydrogen gas*, generated by the decomposition of the animal matter of the shells, or of the fish originally inhabiting them. Or more probably, it may be an exhalation from the wet or marshy places, in which these beds are usually found. The writers on mineralogy in giving the geognostic situation of sulphuretted hydrogen, say that "it rises from sulphureous springs, also from marshy places, and is met with in mines"—or it may probably be produced by some chemical change effected in the earth with *sulphuret of iron*, or of *antimony*, from both of which substances chemists are in the habit of procuring sulphuretted hydrogen. But however generated, the existence of *sulphuretted hydrogen* gas, in the low ravines in which the marl beds are usually found, is extremely probable. This gas is composed of hydrogen and sulphur, in certain proportions. A small portion of sulphuric acid is also supposed to enter into its composition. It possesses decidedly acid properties, for it reddens litmus paper, and forms salts with alkalies. It is hence sometimes called hydro-sulphuric acid. (*Turner's Chemistry*, 252.) Its elements may easily be separated from one another. Thus, on putting a solution of *sulphuretted hydrogen* into an open vessel, the oxygen absorbed from the air gradually unites with the hydrogen of the *sulphuretted hydrogen*, water is formed, and sulphur deposited. (*Ibid.*) It seems therefore that the natural effects of the formation and disengagement of *sulphuretted hydrogen gas*,

in a deposite of shells, would be these: the *sulphuretted hydrogen* coming into contact with the atmosphere, the oxygen of the air would gradually unite with the hydrogen and form water; sulphur would be deposited, and the sulphuric acid (of which the sulphuretted hydrogen is supposed to be in part composed,) would unite with the lime of the shells, forming sulphuret of lime, (or gypsum) and the carbonic acid would pass off in the form of gas. The result of this process in three distinct new formations, viz: *water*, *sulphur* and *gypsum*. This theory is sustained by the following facts.

1st. The presence of *sulphate of lime*, which has been ascertained to exist in most of these deposites, and is believed to exist in them all. The shining particles interspersed through them and designated by Professor R. as *mica*, are most probably *selenite*, or pure gypsum. I hazard this conjecture with great distrust, and would not venture it at all, if it appeared that these shining particles had been separately collected and analysed by him. The term *mica* was probably not used with reference to their chemical composition, but as its etymology imports, to indicate the shining character of these particles; particularly as he speaks in another place of one of these beds of Jersey marl being interspersed with *spiculæ of gypsum*. The order *mica* in mineralogy, is divided into eight genera, and a great number of species, the chemical composition of each of which is different. (*Ed. Enc. art. Mineralogy.*) And it is presumed if the elements of these shining particles had been ascertained by actual analysis, Professor R. would have communicated the result of the process.*

2ndly. The presence of *sulphur*, as indicated by the strong sulphureous odor emitted by this substance when gently pressed and warmed by the hand, and which together with its appearance, has probably obtained for it the name of *gunpowder marl*, and by the total destruction of vegetation occasioned by too large a dressing of it made in this neighborhood, supposed to be the effect of sulphur, which though highly beneficial in small, in large quantities is believed to be fatal to vegetation.

3rdly. From the remarkable fertilizing effect of the gunpowder marl of New Jersey, containing the green sand, and which can scarcely be attributed to the agency of that substance alone, thirty grains of which, according to the analysis of Professor R. contain of

Silica	15.51 grs.
Protoxide of iron,	7.56
Potash,	3.10
Water,	3.00

The most striking effects are said to have been produced by the application of five loads to the acre, of the *gunpowder marl*, containing, we will suppose, in the absence of evidence, 50 per cent. of the *green sand*. Now, according to the estimate of the author of the Essay on Calcareous Manures, of five or six bushels to the load, this would be an application of 25 or 30 bushels of the marl, or half that quantity of the green sand to the acre, which containing about 10 per cent of potash, (the only known fertilizing principle it contains) would make an application of $1\frac{1}{4}$ or $1\frac{1}{2}$ bushels of that substance, or its equivalent to the acre. As the effect of the *protoxide of iron* is entirely conjectural, I leave that out of the estimate. So great an effect, I apprehend, has never been attributed to so small a quantity of potash applied in any form. The green sand or "silicate of iron and potash," can scarcely be supposed capable in any manner of producing this effect. Green bottle glass being composed of impure materials, such as river sand containing iron, and the commonest kind of pearl ashes, may be considered a "silicate of iron and potash," yet we should scarcely attribute any great fertilizing power to that. We may hence conclude that the green sand is totally inadequate to produce the effects attributed to the gunpowder marl, and must look to some other of its ingredients to explain its efficacy as a fertilizing agent.

4th. That gypsum and sulphur are the principal active agents in the gunpowder marl, may be inferred from its remarkable efficacy on clover, observed in New Jersey by Professor Rogers and others, and by an intelligent gentleman in the county of Richmond, whose statements I shall subjoin. I have now before me three specimens furnished by this gentleman, with a view to their being transmitted to Prof. R. They all abound in the shining particles which I have supposed to be gypsum, and differ only slightly in color and consistency.

No. 1, which he designates as blue clay, abounding with impressions of shells, without any calcareous matter, he accompanies with the following statement: "In the spring of 1833, a small quantity of this was beaten fine, and put on young clover to see if it would act as manure. In a very few days the difference in size and color was very perceptible. In the spring of 1834 I gave the whole lot of clover a top dressing of this, (say 300 bushels to the acre) except 15 or 20 feet running through the lot. This I gave a heavy dressing of old ashes, a larger quantity than of the clay. The whole lot of clover was very fine, and I have never been able to discover any difference in the clover, or in the wheat now growing on the lot." Of No. 2, designated as yellow clay, though the blue color predominates, he says: "About 250 bushels to the acre were put on a poor sandy knoll last spring when the clover was sowed. During last summer's drought, it stood and kept its color much better than the lot adjoining, which had been manured with ashes, and the clover is now much greener where the clay was put." No. 3, green sand, corresponding very exactly to the description of the pure green sand of New Jersey. "A small quantity of this was put on about three feet square of very indifferent clover, about three weeks since, and the clover is now much greener, and at least six inches higher than that adjoining it. I suppose the quantity did not exceed two quarts." (Dated 12th of June.) The effect of gypsum on clover is too generally known to be now the subject of remark. But that the same effect has been attributed to sulphur, and proved by actual experiment, has not been so generally noticed, and is probably unknown to a large majority of agriculturists. M. Bernard, the author of a French treatise on the use of gypsum, an extract from which is published in the *Mem. of the Phil. Agr.*

*Professor H. D. Rogers of Philadelphia, in his "Guide to a course of lectures on Geology," states the fact that gypsum is found in the Jersey marl.—*Farm. Reg. Vol. III. p. 200.*

Society, Vol. II. 207, having observed the fertility of the lands in the neighborhood of Catana in Sicily, which abound in volcanic matter, was led to infer the vegetative virtue of sulphur. He caused brimstone to be pounded and sifted, and mixed with ashes, to render the sowing easy. "The effect was surprising on lucerne and clover, but little perceptible on wheat and natural grass." The experience of Judge Peters seems to afford some confirmation of this statement. If sulphur is so efficacious, the difficulty expressed by you, of accounting for the great efficacy of the gypseous earth on the supposition that gypsum was the only active principle of that substance, is at once removed.

5th. This theory receives some confirmation from the fact that these beds are invariably wet near the surface, where the water may be supposed to be formed by the union of the hydrogen of the sulphuretted hydrogen, with the oxygen of the air; and the shells are decomposed only to the depth of a few feet below the surface, to which depth the sulphuric acid in solution may be supposed to percolate.

6th. The blue or green color of this deposite is a circumstance in some measure confirmatory of the theory. "It is a property of sulphuric acid to dissolve a small portion of sulphur, whereby it acquires a blue, green, or brown tint." (*Turner's Chem.* 188.) The color of the marl may be occasioned by a combination of a small portion of the sulphur, deposited by the sulphuretted hydrogen, with a portion of the sulphuric acid supposed to enter into its composition. This may also possibly account for the fact of the change of the color of marl from yellow to blue, produced by putting it in a farm-yard, as reported in a note to the 2nd edition of the Essay on Calcareous Manures, page 69. The urine of the horses, &c. may be supposed to be the agent—for independently of the sulphuric acid which it contains in combination with soda and potash, it is supposed also to contain some acid in a free state, and also a minute portion of sulphur.

The result of this theory, if it be correct, is that the gunpowder marl of New Jersey, and the similar formations in Virginia, do not owe their efficacy entirely to the green sand, as has been supposed, but mainly to sulphur and gypsum, two powerful fertilizing agents. And as a consequence, most important to the agriculture of eastern Virginia, that the upper strata of our marl beds, containing the impression of shells, and heretofore regarded as comparatively worthless, are the most valuable portions of these deposites.

The correctness of this theory might be with certainty tested, or at least the truth of the proof adduced in support of it, by chemical analysis. And it may be asked why is this not done? To make a perfect analysis of a compound substance, such as the green sand or marl, is a task requiring a degree of care, patience, and scientific knowledge, to which few persons can lay claim. It is no difficult matter to analyze a specimen of marl, so as to ascertain the quantity of carbonate of lime contained in it; but this operation falls far short of a complete analysis, or resolution of any compound substance into its elements. All the analyses of marl, the results of which I have yet seen, have been confined principally to this object. A complete analysis of this substance is much to be desired.

In offering these crude conjectures to your readers, I beg to be understood as claiming for them but a small degree of confidence. I make no pretensions to the character of a chemist—all the knowledge I possess of the science having been derived from attending at a very early period, the usual collegiate course, and from such subsequent reading and reflection on the subject, as its intimate connexion with agriculture has induced me to bestow upon it. If this communication should have the effect of engaging for this interesting subject the attention of other gentlemen, whose greater knowledge and better opportunities for investigation, will enable them to afford more satisfactory information to the public, all that I desire will be accomplished. That the physical sciences are yet in their infancy is most obvious; and what we now vainly call philosophy, is but the alphabet of that universal knowledge, which, in the course of future ages, will be developed, by the energy and intelligence of man. Yet enough is already known by those who have studied nature, as far as her wonderful and mysterious operations have yet been explored, to enable them to impart to others much useful and interesting information. The cause of science, and the interests of agriculture and the arts, require that it should not be withheld.

WILLOUGHBY NEWTON.

Linden, (Westmoreland,) Aug. 12, 1835.

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[It is gratifying that the inquiring mind of our correspondent has been directed to an important and interesting subject, which has in no respect been yet made clear—and which still needs better explanation than is furnished by the foregoing theory. It is hoped that others will aid in the investigation, and that satisfactory and valuable conclusions may be thereby reached. Having elsewhere given our early opinions at large concerning "gypseous earth," in the article referred to above, we shall now merely mention very concisely, a few facts, or deductions from facts, which seem to bear on Mr. Newton's reasoning.

The shining particles which Prof. Rogers called *mica*, and which are generally, if not universally seen in this earth, are not *selenite*. This would sufficiently appear from the correctness with which that gentleman would certainly apply the names of such very different substances presented in specimens under his examination. Long before we had ever heard of "green sand," or had seen a specimen of "Jersey marl," or had met with any person who was better acquainted with it, we maintained the identity of the latter substance with the "gypseous earth" of Virginia, and attributed the value of both (when there was any value,) solely to gypsum. But gratifying as it would have been to have had the proof which the universal presence of gypsum (or selenite) would have afforded, the rough modes of chemical investigation used seldom found that substance, which could not have been the case if it composed all the shining particles contained.

In the body of gypseous earth at Berkeley, sul-

phuret of iron was found—and in another body, a fluid containing sulphate of iron oozes out, and when dry forms a crust on the surface. Both these substances, if meeting shells, would decompose them and form gypsum—and thus, at least, would aid the process attributed above to sulphuretted hydrogen alone.

In many localities the upper layer of shelly marl has been changed as above described by Mr. Newton —and the shells, and every trace of calcareous earth removed. In addition to his experience on this head, in Westmoreland and the adjacent counties, we will name the marl beds of Henrico and of Hanover, where the same appearance is frequent, if not general. But in Prince George, near James River, there is no such change in the upper layer of any marl that we have noticed or heard of. The gypseous marl of Coggin's Point, (a very peculiar kind, described p. 43, Essay on Cal. Man.) throughout its whole extent, as exposed to view for more than half a mile along the river bank, lies *upon* gypseous earth (of unknown depth,) from which all calcareous earth has disappeared, but leaving abundant evidence of its former presence in the hollow forms of shells.

Many calcareous marls contain a little gypsum, which of course gives additional value and effect to the manure. But the *wet* beds can hardly contain gypsum—as even if it had been present at a former period, it must have been dissolved in the water, and carried off by the continual oozing.

We concur entirely with our correspondent in the opinion that the chemical analysis of green sand has exhibited no constituent part or parts, to which can be properly ascribed its remarkable effects as manure—and also, in considering these effects, precisely similar to those of gypsum. So far as our limited experience goes, the two manures act on the same kinds of plants, and of soils, and are alike totally inoperative under other particular circumstances. The direct effects of both are transient. Neither will be found valuable, (and generally have not the least effect,) on "*acid* soils," or those the most destitute of lime in every state of combination—and both become active on such soils if made calcareous. However, the green sand, to our own knowledge, has sometimes acted with greater energy than gypsum—and besides, we have yielded to Mr. Rogers' views our earliest impression, that gypsum constituted all the value of this earth. But highly valuable and important as are the effects of these manures, in aid of, and addition to, calcareous earth, there is no doubt of the immense superiority of the latter. Of course, green sand can never substitute calcareous manures, though it, (or gypsum in its place,) may indirectly, and in connexion with clover used as manure, serve to double the profit derived from calcareous manures alone.]

From the Farmer and Gardener.

CALCAREOUS SOIL FOR VINES.

Permit me to lay before your readers the following extract of a letter from Mr. Herbemont of SouthCarolina, the most successful wine maker in this country. The advice he gives on the application of calcareous earths to vineyards, is important; and comes with peculiar force and propriety from one of so much experience and so capable of profiting by experience. Let me add, that the wine made by Mr. Herbemont, is of very superior quality, particularly his white wine, which has been said by good judges to resemble the *Sauterne* very closely.

Yours,

G. B. S.

Extract of a letter from N. Herbemont, Esq. to Gideon B. Smith, dated Columbia, S. C. Sept. 25th, 1835.

"I am much obliged to you for the trouble you have taken, and the consequent information you give me relative to the culture of the grape in your vicinity. The last winter was the most severe one ever experienced here within the memory of our oldest men. It could not have been less so in Maryland. Our foreign vines were almost all killed down to the ground; but my Madeira, or, as you call it, the *Herbemont* and Lenoir stood it bravely. I am glad to learn that some of your zealous gentlemen do not despair of success. Perseverance is the thing, and I do not know an object more worthy of it. I beg you will tell such of them as you may see, that the more I read and reflect on the subject, the more I am satisfied of the propriety of manuring the vineyards largely with calcareous earths, fossil shells or marl, or lime, provided the latter is no longer caustic, using at the same time such other manures as rich vegetable mould or cow pen manure. The expense of this should be disregarded, and for the sake of economy a small extent of ground, say half or one acre might be tried first. What if it should cost one hundred dollars to put one acre of vines in proper condition, this would be nothing, if success is the consequence; for $100 as the principal would then yield from 500 to 1000 gallons of wine, which at $1 50 would be an interest not to be complained of."

Let me add, as one of the *reasons* for the application of lime in any or all of its forms, to vineyards, that it is supposed by experienced men, that lime protects the soil, and, consequently, the plants growing in it, from the effects of severe cold in winter and droughts in summer; and this, too, in addition to its other not so well understood properties of fertilization.

G. B. S.

From the London Mechanic's Magazine.

THE BLEACHING MANIA; FROM A LECTURE DELIVERED BEFORE THE CHELMSFORD MECHANICS' INSTITUTE; BY JOHN MURRAY, ESQ. F. S. A., &c.

Chlorine (from a Greek word signifying green) is the characteristic name given to a gas discovered by Scheele, in 1774, and called by him *dephlogisticated marine acid gas.* It was some time ago more generally known by the name of oxymuriatic acid gas, from a presumption (now considered to be erroneous) that it contained oxygen; and among manufacturers it goes by the name of the bleaching gas. The mode of obtaining it is very simple. We take black oxide of manganese and

mix it with a small portion of muriatic acid, in a glass retort, and on the application of heat the chlorine is evolved. Either alone, or in combination with lime or magnesia, it may be, and is, employed for bleaching paper. I have no objection to its being used by the manufacturer in bleaching his linen and calico, but against the practice of bleaching paper I do protest. The consequences of thus using chlorine—which has the property of destroying ink and other colors—are, that many valuable epistles become illegible, and some have even dropped to pieces on the road. Some of our best modern books are already tottering on their shelves; and numerous deeds and valuable writings, requiring to be kept a great number of years, will, ere a very few, become useless. I have in my possession the remnant of a royal octavo volume, one of an edition of 30,000 copies, printed at the University press in 1818, and it is a singular fact, that there is not a perfect copy now existing. We find that when any thing of a delicate color is wrapped up in white paper the color is destroyed. A silk manufacturer once told me he could not preserve his colored silks; he used the whitest and cleanest paper he could procure to wrap them in, but the colors invariably faded, I told him for the future to wrap them in common colored, or brown, paper—he did so, and the silks retained their delicate hues. Paper stainers have lost hundreds of pounds in value, in consequence of the destruction of their goods by chlorine. This gas has also the property of dissolving gold. I knew a button merchant, who sent a quantity of gilt buttons to London for sale; being an expensive article, he took care to have them securely packed in white paper that they might be kept perfectly clean. The consequence was that the gilt corroded, and the buttons were returned unsaleable. Every thing now-a-days—such is the rage for bleaching—must be bleached. Our linen must be bleached, though by that means we render it yellow; our calico must be bleached, our ginger must be bleached, although at the expense of destroying the very principle which renders it valuable; and by-and-by, I suppose, we shall be bleaching our daily bread. Let us, however, view the case as we ought. If we have an inferior article, paper for instance, the fault is ours, not the paper makers.

We fix our prices, and if I am determined to have a quire of paper for 4d. the manufacturer knowing he cannot furnish it of sterling quality, is obliged to resort to the expedient of bleaching, for the purpose of giving a good exterior to a bad material. Perhaps the subject may be illustrated this way: suppose I want a pound of confectionary, I walk into the confectioner's, and say, "if you let me have it for 4d. I'll take it, and if not, why I can obtain it elsewhere;" never, for a moment, recollecting that the very materials, or perhaps merely the sugar, costs double the sum. The consequence of this mode of proceeding is, that we have the privilege of swallowing with our confectionary a sufficient quantity of chalk. To such a pitch has the bleaching of paper been carried, that government find themselves obliged to employ a person to watch the manufacture of the paper they require, for the purpose of securing it of a good quality. I know of two cases in which letters containing money have fallen to pieces by the road. One was directed to the post-master of Sheffield, and it so happened that the check was found in the post bag—the person for whom the other letter was intended, was not so fortunate. Every thing is now made up into paper, and in consequence of its being bleached, we do not so easily detect the inferiority. I have by me specimens of paper made not only from wool and leather, but from the bark of the willow, from hay and straw, potato peelings, wood shavings, saw dust; and in short, any thing can be made into paper, *such as it is*.

From the London Horticultural Register.

CULTURE OF THE CAULIFLOWER.

The ground on which the cauliflower plants are intended to be planted can scarcely be made too rich, therefore lay on a large portion of rotten dung, and dig it well in.

The best soil in which to sow the seed is one somewhat light, and for the first spring sowings rather rich; at all other sowings this is not material.

Always plant in open, airy situations, for the plants will never form good heads under the shelter or drip of trees; sometimes none at all.

The varieties known amongst us are only two, the early, and the late. The difference betwixt them is very trifling; the one called the *early*, has a slight purple or red color in its stalks, and probably is a little hardier than the other, and therefore is generally sown in the autumn, to preserve in frames or under hand glasses, for the first crop in spring.

Cauliflowers are raised annually from seeds, and are liable, like cabbages, to be impregnated by bees, &c., during the time of flowering.

There are three principal seasons for sowing, and all three require some little difference in their treatment.

First sowing season.—This continues from February to the end of March, and the plants are intended to succeed those sown the previous autumn. During this season, two sowings are usually made, one in February, and the other in March; both require precisely the same treatment, which may be stated as follows:—

Make a hotbed about two feet six inches thick, and as broad and long as may be necessary, for the seed intended to be sown.

When the bed is made, put on a frame, and cover it down with lights, to draw up the heat, and let it remain about a week to settle, which will reduce it to something less than two feet; then take off the frame, and level the surface of the bed nicely, and replace the frame again on the bed.

This being done, lay about six inches thickness of light rich soil, and on this thinly scatter the seed; sift a little soil over the surface, just to cover it. On the same bed, both radishes and celery may be sown, as they will interfere very little with each other by being mixed.

After the seed is sown, cover down the frame, and so let it remain, until the young plants begin to appear, which will be in a few days. Then give air, and in a few days afterwards remove the lights altogether, during the day, and merely shelter them at nights from sharp frosts, or heavy dashing rains. Or, if the frame be wanted for

other purposes, it may be removed altogether, and the bed merely sheltered by hoops and mats.

If it is not convenient to spare a frame for the purpose, one may be made of turf walls, about eight inches high in front, and twelve at the back, and by laying a few bearers across, it may be readily covered with mats, or even hoops will answer the purpose very well. And should the cultivator not have the conveniency for making a hotbed, delay the sowing till March, and select a nice warm border facing the south.

When the plants have become an inch high, prick them out, about three inches apart, either on a warm south border, of light rich soil, or on another slight hotbed; and from this nursery bed, they will be taken to their final destination.

The second crop should be sown in the last week in March, either on a slight hotbed, or on a warm border, which answers the purpose exceedingly well at this time of the year.

The second sowing season.—The sowing at this season is to produce what are usually termed the Michaelmas crop of cauliflowers. This sowing should take place about the third week in May, and a shady border should be selected for the purpose; or if the weather becomes very dry, the plants will suffer notwithstanding all the care that may be taken in watering.

Prick out the plants, when large enough, as recommended for the early sowings, and allow them to remain there until the third week in July, when they may be transplanted into the situations where they are to form heads.

Third sowing season.—This season extends from the middle of August to the middle of September, and is intended to produce plants to stand the winter, and to plant out early in the spring for the main early crops, which are generally the finest. We prefer sowing this crop about the second week in September, because when sown in the middle or towards the end of August, they often become too large before winter, and are more liable to be injured by frost, unless they are checked in their growth, which often ends in their buttoning; that is, forming small heads very early in the spring, which, to say the least, is a very great disappointment.

Sow the seeds on a warm border in light soil, and when they are large enough, which will be about the beginning of November, transplant them in the situation where they are intended to stand the winter. This is either under a south wall, where they will receive no covering, under hand glasses, or in frames.

Where the cultivator has not a frame or hand glasses to spare for the purpose, they will do remarkably well if planted as close under a south wall as they can be placed; and if the weather be very severe, a slight shelter may be given them, but in general, this is unnecessary. These will not be quite so early in forming their heads as those in frames, or under hand glasses.

Planting under hand-glasses.—Prepare some rich ground, in a warm situation, for this purpose, by digging in a good quantity of rotten dung. Then place the hand glasses about four feet distant from each other, and proceed to plant from six to twelve plants under each, according to the size of the glass. If the day be dry when they are planted, it will be necessary to give them a little water; place on the glasses, and keep them close shut until they begin to grow; then raise the glasses on the south side, with a brick, to admit air in fine weather, being particularly cautious not to keep them too tenderly.

In fine mild weather, during winter, take the glasses entirely off all day, but in frosty weather, and very heavy rains, secure them well from being affected, otherwise in spring, most of the plants will be lost. They may be easily secured from frost by mats or litter, and from rain, by shutting the glasses closely down.

It is very possible, that in mild weather, towards spring, the plants will be infested by slugs; the evils resulting from these may be prevented by sprinkling quick-lime round each plant, or sowing it all over the ground amongst them.

Keep them sheltered by these glasses till towards the end of April, (continuing fully to expose them in all fine weather, and secure them from frosts;) at which time they will have been thinned out to three or four under each glass, and those drawn out, have been planted in the situations appointed for them to produce heads.

Planting in Frames.—Place the frame on a south aspect, and in the beginning of November, or the end of October, transplant the cauliflower plants in rows, four inches apart, and three inches from plant to plant in the rows; place on the lights, and keep them close shut down, until they begin to grow, then give air in fine mild weather, as recommended before, for those in frames; but secure them from frosts by mats or litter.

A method we have practised at Chatsworth, for some years, may be safely depended on, for producing heads somewhat earlier than can be obtained by the usual mode of planting in frames. This is, by potting a number of fine plants in 60 sized pots, at the end of October, and plunging them in the frame, with the other plants. On the approach of spring, if these roots have filled the pots, it would be advisable to place them in layer; they will greatly outstrip the others in growth, and at the end of April, when they are planted out in the open ground, they will be a good size; and meeting with no check in their removal they will speedily form their heads.

Some persons keep the pots in a vinery, or other house, where a moderate heat is kept; we have tried this plan with success, but they are liable to button, after being turned out.

Final culture, &c. of the three crops.—The mode of final culture for all is much the same in substance, but differs in detail, in consequence of the seasons at which they are sown; so that it becomes necessary to treat of them separately. And first:—

Final culture of the first sowing.—In the beginning of May, prepare to plant them in their final destination, which must be on an open, rich, quarter of the garden, well manured for the purpose.

Take up the plants carefully from the nursery beds, with good balls, and plant them on the quarter prepared for them, in rows four feet apart, and two feet six inches from plant to plant in the rows.

If the weather be dry, water them as often as they require it; either with manured water, or not, as may be convenient; the former will stimulate the plants to grow finer.

The plants raised from the second sowing at,

this season, should be finally planted on a rich north or north-east border, where they will produce heads from the beginning of August.

Final culture of the second sowing.—About the end of the second week in July, plant these, as recommended for the last, on an open quarter. Give them water as often as they require it, and they will begin to produce heads in October; and, if the weather be mild, will continue to do so throughout November and December.

Preserving during winter.—There are many ways of doing this, a few of which we will detail:—

Cut them on a fine dry day, strip off all the leaves, except those close to the head, and bury the heads under dry peat earth; this plan answers very well, for keeping them, but they become so filled with dirt that they rarely or ever can be got wholly free from it again.

Another way superior to the last, because they are not so liable to be dirtied, is to put them in boxes or small barrels, and bury them in a stock of turf, such as is used for burning. We believe this was originally practised by Mr. McIntosh, who detailed it in the Gardener's Magazine; this system, however, has its disadvantages, for the close confinement of the heads in boxes or barrels gives the vegetables an unpleasant taste.

They also keep exceedingly well buried in sea sand, perhaps better than in any thing else yet made use of; but they are liable to the objections made against the first system; namely, becoming filled with grit, which can scarcely ever be removed; and another obstacle presents itself here, sea sand cannot be obtained without greater expense in inland counties, than the value of the cauliflowers would warrant.

A system is mentioned in the Caledonian Horticultural Transactions, which consists in burying the whole plants out of doors. On a fine day, dig a trench close under a wall, wrap the leaves well about the heads of the plants, and place the plants head downwards in the trench; then lay the soil lightly over them, in a sloping direction from the wall, and smooth off the surface with the spade, that it may carry off the rain. This system, however, we can say little about, having never tried it.

Another plan often practised, is to draw up the whole plants on a dry day, and without trimming off any leaves, hang them up by the heels to the roof of a dry, airy shed; the only objection to this plan, is, that the heads lose all that beautiful crispness, and become flabby, and less pleasant to the taste.

Another, and a still better plan, is to take them up in fine weather, with good balls, and plant them in good light rich soil in a back shed, mushroom shed, or any other convenient place of the kind; and if kept free from dead leaves, they will soon form their heads in that situation, and be very good for table.

But the best method we have met with, where there is the conveniency, is to plant them in a brick pit, when severe weather comes on, and by removing the glasses in fine weather, and preserving them from foul, we have cut very fine heads, as good as could be grown out of doors, until the middle of February, when the winter was very severe.

Final culture of the third sowing.—About the middle of April, take up those plants with good balls, that have stood the winter under walls and in frames, and plant them in the situations appointed for them to form heads.

Take up all, except three or four of those remaining under hand glasses, and supply all deficiencies, about the end of March. Draw a little earth round the stem of each, give them plenty of air, by propping up the glass on the south side, and as the plants advance in growth, raise the glasses all round by means of bricks, and finally, about the beginning of May, remove the glasses altogether.

The crops will, therefore, come into use as follows:—

1. Autumn sowing for preserving through the winter.

a. Those potted, and preserved in frames, and finally planted under hand glasses, at the end of March, will produce heads early in May.

b. Those growing under hand glasses, either planted from the frames at the end of March, or having stood there all the winter, will produce heads by the end of May.

c. Those removed from the frames in April, to the open quarters in the garden, will produce by the middle of June.

d. Those sheltered under walls, and planted in open quarters in April, will produce by the end of June.

2. Those sown on a hotbed, in February, and planted out finally in May, will produce heads by the end of July or beginning of August.

3. Those sown on a warm border, in March, and finally planted out in May, will produce by the middle of August, or towards the beginning of September.

4. Those sown in May, and finally planted out in July will begin to produce in October, and continue through the winter.

Insects and diseases.—Whilst young, they are often destroyed by the ravages of slugs, and when grown to a large size, they are often infested by caterpillars, particularly those of the green-veined white butterfly *(Pontia Napi)* which secrets itself in the head, and is hard to be discovered, the turnip butterfly *(Pontia Rapæ.)* The cabbages brightline moth, *(Mamestre Oleracea)* and the common cabbage moth *(Mamestre Brassicæ.)* The only way of keeping clear of these is to hand pick them.

They are also infested with the larvæ of a fly, which causes the clubbing at the roots; many means have been adopted to prevent this, none of which, to the best of our knowledge, are efficient remedies. Charcoal dust has been found to have a good effect as a preventative, when spread over, and dug into the bed, and soot has been found to have a similar effect, but neither can be depended upon, at times.

RAIL ROAD PROPOSED FROM WYTHE COUNTY TO JOIN THOSE CONNECTING PETERSBURG AND PORTSMOUTH WITH THE ROANOKE.

Address to the Citizens of Virginia and North Carolina.

At a convention of Delegates assembled at Danville on the 5th day of October 1835, for the purpose of taking into consideration the projected

improvement by a rail road from Evansham to Danville, and thence to some points in connection with the improvements to the Roanoke—among other proceedings the following resolution was adopted.

'Resolved, That a committee be appointed to prepare an address to the citizens of Virginia and North Carolina showing the practicability and importance of the proposed rail road.'

In pursuance of the duty devolved on them by the foregoing resolution, the undersigned beg leave to offer to their fellow citizens of Virginia and North Carolina, the following facts and considerations.

An inspection of the map of Virginia, as connected with her southern and south-western boundary, offers at a glance to the eye of the examiner an immediate and direct communication by the channel of the Roanoke, between the great south-western valley, and our Atlantic border. A rich and expanded area of the surface of Virginia, embracing not less than ten thousand square miles, with a population of one hundred and eighty thousand souls, a wide extent of the territories of Tennessee and Kentucky and the richest portions of our sister state of North Carolina, embracing of her population one hundred and sixty thousand souls, seem at once connected by the ties of a common interest in this common channel of commerce, which want of energy or want of resources in our people has hitherto left unimproved. It behooves us now to exhibit to our fellow citizens the facts and calculations by which we ourselves have been irresistibly drawn to the conclusion that the removal of all obstructions to the free enjoyment of that channel and of the rich fruits matured by the increased activity and energy which such an improvement must infuse into all the operations of our people, is practicable; is within our immediate resources; and is promptly and urgently called for, by every consideration that can influence men determined to avail themselves of the great blessings which nature has scattered around them, with a lavish hand. The experience of a few years, yet ample in that time, the eminently successful experiments made in Europe, on our continent and even in our state, demonstrate the superiority of rail roads over all other improvements. Where nature has furnished, free of expense, a direct and continuous channel of navigable water from the interior to the seaboard—such improvements may not be required. But that mode of communication is denied to us, and accordingly the Convention has determined on an immediate survey of a route for a rail road from Evansham in the great valley of the south west, to some points in connection with the several rail road improvements to the Roanoke. Is the contemplated work practicable? We assure our fellow citizens that every means of obtaining information, short of an actual survey of the specific route has been resorted to, and we are prepared to assert that it is not only practicable, but in our opinion, presenting fewer obstacles to its accomplishment than any known work of the same extent, on the continent of America.

Which ever route may be ultimately selected between the eastern and western limits of the contemplated improvement, the distance cannot far exceed a line of two hundred and ten miles.

Of that extent one hundred and sixty miles at least must be in a champaign country, along the valley of the Roanoke, resembling in its general features that country in which the rail roads already completed and in progress, are located; differing however in some important particulars, in the increased fertility of the soil and consequent cheapness of provision on this route, and still more in the greater abundance, cheapness and accessibility of all the materials for the construction of the work. Of the remaining fifty miles, six may be taken, as a large estimate for the mountain section, which has hitherto alarmed the timid, and presented an obstacle even to inquiry. Let us approach it undismayed, and how insignificant does it appear? There is no person acquainted with the features of our mountain scenery, that has not observed how much lower is the general swell of the mountains, constituting the boundary between Franklin and Patrick on the one side, and Floyd and Grayson on the other, than along the same range northwardly.

Over that range, at some point, the route must lie, innumerable gaps and gorges offer favorable locations for roads of every kind, and the observations of the practised hunters of these mountains assure us, that there lies in the contemplated line, a gorge offering a route with slight exceptions, already graduated by the hand of nature. But suppose the intervening hills as stubborn and impracticable as those which the enterprise of Pennsylvania has tamed to her uses, suppose them presenting as much difficulty as those in the way of the once contemplated rail road from Lynchburg to New River, are they such as to deter us from this great enterprise?

The report of Col. Crozet on this subject made to the board of public works 26th December 1831, furnishes the following details applicable to our case:

Over Buford's Gap the highest rise on the rail road, is	75 feet per mile.
The highest estimate of expenditure per mile contemplating granite sills for the section is	$14,000 per mile.
The highest average expenditure on the whole route from Lynchburg to New River is	$11,000 per mile.

Let us then suppose as many difficulties in our route as the State Engineer reported, to offer themselves in the route from Lynchburg to New River, the greatest difficulty which he should encounter, would be an elevation of 75 feet per mile over a section of six miles, and that wholly in favor of the heavy traffic: and the greatest average expenditure on a section of fifty miles would be, $11,000 per mile. With these facts we can no longer doubt the practicability of the work at a moderate expense. We entertain no doubt however, that the estimate and surveys of an experienced engineer will bring the expenditures and difficulties far within this admission. Assuming then the estimates of Col. Crozet for a more difficult route, the upper section of our work embracing a line of fifty miles at $11,000 per mile would cost $550,000

The lower section, taking the highest combined average of the Petersburg and Roanoke, and the Portsmouth

and Roanoke rail roads predicated on actual expenditures, would be $8,000 per mile, making for one hundred and fifty miles the sum of	$1,200,000
presenting an aggregate expenditure on the whole of the proposed route of	$1,750,000

Allowing then for every contingency and the most unfavorable result of the surveys, it may be safely asserted that the round sum of two millions of dollars would cover the whole expenditure on the contemplated work.

Is that a sum within our resources? Is its magnitude such as to deter us from the prosecution of an enterprise. pregnant as we believe it is with blessings inestimable to so large a portion of our people? Upon this part of the subject no observation of ours can be necessary.

In times like these of unexampled prosperity, when so large a portion of capital in every part of our wide spread confederacy is courting a profitable investment, it can only be necessary to show that ample returns must reward the investment to insure the application of the estimated sum to any contemplated work.

By a reference to 'the synopsis of the James River and Kanawha Improvements, &c.' we find the amount of tonnage on the south western route, embracing part only of that region which must inevitably seek our improvement as the cheapest and most expeditious, estimated at 100,000 tons. Of this by far the largest portion is now carried to Baltimore at an enormous expenditure of time and money. The time ordinarily occupied by a wagon in travelling from Wythe court house to Baltimore may be estimated at fifty days, while on the contemplated rail road the rich productions of the valley may reach Norfolk, Petersburg or Richmond in two days, or the Baltimore market in three. Taking then as the basis of our calculation the report of the state engineer confirmed by the report of the Abingdon Convention, as set forth in the synopsis above referred to, we may estimate the immediate trade meeting this improvement at Evansham as yielding a tonage of 100,000 tons.

To this add the trade of the counties east of Wythe in Virginia and North Carolina bordering on the proposed road, which on the fairest principles of calculation known to the committee may be estimated at	50,000 tons.
The aggregate amount of tonnage now anually seeking its destination by wagons, and other means of transportation is	150,000 tons.

From this calculation are excluded the vast mineral resources on the immediate line of the road. The salt, lime, gypsum, iron and lead, the three last sufficient to supply every possible demand, in fact, inexhaustible, yet according to the report of the Abingdon Convention, which valuable document we beg leave to recommend to the attention of the public—"The transmission of mineral productions of south western Virginia and East Tennessee, would form the largest source of profit to the stock holders of the rail road company." Add to all these the continued stream of travel which now runs through the southwestern valley, and which, as certainly as cheapness, comfort and expedition invite the steps of the traveller, would mainly be diverted to the projected route, and the revenue of the road would swell to an amount which this committee would feel reluctant to indicate. Here we reach the great thoroughfare to the south and southwest. Since January last not less than thirteen thousand slaves alone have passed the western terminous of this improvement. But excluding from our estimate of profits all these sources of revenue, excluding also every prospective addition to these resources which may be derived from the awakened energies of a people now slumbering over their invaluable interests; and confining our calculations to the tonnage known to exist, and now inviting this improvement, we shall see that on a capital of $2,000,000, adopting the calculations of Col. Crozet, the return would almost exceed credibility. Suppose the 150,000 tons actually seeking its destination, to travel on an average only through half the extent of our contemplated road, and suppose the average on freights, exports and imports to be reduced to four cents per ton per mile, the aggregate amount of the tonnage on the road would yield a revenue of six hundred thousand dollars annually.

Without pretending to accuracy in all our estimates and calculations. although they seem to us based on undeniable facts, and on the public reports of accredited public agents, we may safely assume that no error can place the revenue on this investment below twenty-five per cent. It may be objected that we have not taken into consideration the cost of the necessary engines, superintendence and repairs. To meet this objection, we suggest that the conveyance of passengers and the transportation of the mails must amply cover, if not largely exceed all such incidental expenses. But should our expectations from these sources prove fallacious, can a doubt be entertained that the transportation of the minerals above referred to which as certainly as the work shall have been constructed must, in large quantities, be transported on this route, will more than compensate for any deficiency in the other resources of the improvement.

In presenting these details we have endeavored to exhibit a simple and condensed view of the commercial advantages of the contemplated work. We cannot, however, overlook the social and political benefits which it cannot fail to secure. Who can look upon our vast territory and observe the advancement of our people in those stupendous improvements, which, spurning the common limits of space, are throwing their chains over the extremes of our union? Who can behold the continuous links which are already connecting Boston with the Roanoke on the east, and which promise to bring Mobile and New Orleans in close approximation with the southwestern valley, that does not feel the necessity of completing the intermediate link? In peace how largely must it contribute to the promotion of kind and social relations between the different portions of our territory? How rapidly will it diffuse among our people the blessings of knowledge and information? In war, should that evil unhappily come upon us, what invaluable facilities will it afford to every operation, whether designed for the annoyance of a common enemy or for the defence of our common country? In every view which we take of this

work, its importance rises before us. As promoting commerce, agriculture and the arts, as strengthening and extending every tie of social life, as giving vigor to our arms, and stability to our institutions, we recommend this work to the warm support of our fellow citizens of Virginia and North Carolina.

GEO. TOWNES,
C. C. LEE,
N. M. TALIAFERRO,
B. W. S. CABELL.
BARTH W. EGAN.

From the New York Farmer.

RAVAGES OF AND REMEDY FOR THE NORTHERN WHEAT INSECT.

The grain fly, or insect, which, for a few years past, has been so destructive to wheat in many parts of the country, has this year extended his ravages, and excited, wherever he has made his appearance, very serious alarm. An eminent farmer in the State of New York wrote to me a year since, that he must give up the cultivation of wheat, as his crops were so much injured that he hardly obtained a return equal to the seed sown. I knew another instance in the same state, where, though the straw was large and the appearance promising, yet from thirty bushels sown not more than seven were obtained. I have known other cases in which the whole field has been mowed and sold for litter; and in a recent excursion up the valley of the Connecticut, I have heard complaints every where, and seen hundreds and hundreds of acres so destroyed that the grain they would yield would hardly pay for the reaping. Besides this, the same insect has destroyed many fields of rye in the same manner as the wheat, and had been found this year in the oats; the progress of the insect has been about forty miles a year; and a distinguished gentleman in Vermont, a practical and extensive farmer, remarked that he feared they would on this account be obliged to relinquish the cultivation of small grains.

The habits of the insect have not yet been accurately observed. I myself have not yet seen the fly, but have seen the worms in the kernel after the grain has been destroyed. He is represented as being a small reddish fly, which is seen hovering over the wheat fields in immense numbers, while just in flower, and has been observed to alight upon the kernel or bud, to ascend it, and then descending in the inner side, to deposite his egg between the stalk and the kernel. I purposely avoid the use of all scientific terms, wishing to be understood by common farmers. From this egg the worm is generated, which entirely consumes the grain while in the milk, leaving nothing but the husk, in which are found several small yellow worms, about an eighth of an inch in length. As the work of destruction is now completed, any farther observation of his habits are of no importance, unless we can some way reach so as to destroy the germ of the future insect. No preparation of the seed or ground, however, has as yet been found effectual to this end.

The continuance of the fly upon the grain is thought not to exceed three or four days, and they are, seen in greatest numbers just at night. Some farmers have found late sowing a partial security, as the season for the flies has passed away before the wheat was in condition for their attack. Spring wheat sown as late as the 20th and 28th of May has in a great measure escaped, while some sown as late as the 7th and 8th of June has been untouched, though in cases of such very late sowing, the farmer will be very fortunate if, in attempting to escape the fly, he does not get nipt by the frost.

I have now, however, the extraordinary happiness of announcing to the agricultural public, what there is reason to believe will prove an effectual, as it is a reasonable and feasible preventative. Should it prove effectual, the remedy will be worth millions and millions of dollars to the country. It was communicated to me on a late tour of agricultural inquiry and observation by Dr. Eliphalet Lyman, of Lancaster, N. H., an intelligent and practical farmer, whose crop of wheat usually averages from twenty-five to thirty bushels per acre. It consists in the application of fine slacked lime to the wheat just at the time of its heading out and flowering, at the rate of about a peck to the acre. It is sown broad-cast upon the wheat while the dew is on, and the field is rendered white with it. The best mode of applying it is with the hand, and for the person, who sows it, taking his proper breadth or cast, to walk backwards, so that he may not cover himself with the lime. It must be sown while the wheat is wet or the dew is on, and the philosophy of its application is very simple. The maggot of the fly is deposited between the grain and the stalk. It is, of course, an animal substance. The lime, or alkali, mixing with the dew, is carried down upon it, and neutralizes or destroys it. Dr. Lyman has now tried this preventative three successive years, and has invariably, as he assures me, saved his crops, while those of his neighbors have been destroyed.

I visited, at the same time, the field of a Mr. Bellows, in the same town, who had been advised by Dr. Lyman to make this application. The field consisted of several acres. He did it, and it has proved successful; and what is strongly confirmatory of the value of this remedy, is the fact that a field of rye belonging to Mr. Bellows, adjoining his wheat, and I think within the same enclosure, which was not limed, has been nearly destroyed by the fly.

These are certainly very important experiments, and I make no delay in presenting them to the public. Dr. Lyman has promised me a more particular account of the experiment and result, and likewise Mr. Bellows, which, as soon as received, I shall be happy to communicate. I have received an indirecet and indefinite communication, that the same experiment has been successfully made in Gilmanton, N. H., but I have not yet been able to obtain either the name or the details.

HENRY COLMAN.
Meadowbanks, Sept. 15th, 1835.

AN EXPERIMENT OF EMANCIPATING NEGROES, UNDER VERY FAVORABLE CIRCUMSTANCES.

[The reader will observe that the following statement is not made by a slave holder, nor was it written or published in a slave holding state. The source from which it proceeds leaves no ground whatever for the

suspicion that might otherwise exist, that the facts had been exaggerated by the prejudices or self interest of the holders of slaves. Such results as are here presented, of this experiment made in the free state of Ohio, have been also found in more than one instance in Virginia, when negroes were emancipated, and provided by their former owners with sufficient means for present subsistence, and future accumulation of property. We should be glad to be furnished by some of our Prince Edward subscribers, with a particular account of the descendents of the emancipated negroes in that county, which formerly belonged to Randolph's estate. That experiment has been in operation for some generations. The results, if correctly and minutely stated, would throw much light on this subject.]

From the Cincinnati Gazette.

Some forty miles from Cincinnati, to the east, are two settlements of free negroes—probably near a thousand, men, women, and children, of the true ebony color, with a very little mixture of the mahogany or lighter shades. The negroes own the lands occupied by them; but without the power to sell. Each family has a small farm. They are emancipated slaves, and these lands were purchased *expressly for them*, and parcelled out among them about fifteen years ago.

Their lands are not of the best quality of Ohio lands; but, by good management, could be made very good—they are particularly well adapted to grass, either meadow or pasture.

Having been formerly slaves, and compelled to work, one would suppose they ought to have *industrious* habits. They have had every inducement to industry and good conduct held out to them. The experiment was to test the merits of the negro race, under most favorable circumstances for success.

Has this experiment succeeded? *No, it has not.* In all Ohio, can any white settlement be found equally *wretched*—equally *unproductive*?

Farms given to them fifteen years ago, instead of being well improved, and timber preserved for farming, have been sadly managed—small, awkward clearings and those not in grass, but exhausted and worn out in corn crops—the timber greatly destroyed—wretched log houses, with mud floors, with chimnies of mud and wood—with little timber for further farming.

They are so excessively lazy and stupid, that the people of Georgetown (near by their 'camps') and the neighboring farmers will not employ them as work hands to any extent. They do not raise produce enough on their lands to feed their families, much less do they have a surplus for sale abroad. They pass most of the time in their little smoky cabins, too listless even to fiddle and dance. One may ride through the 'negro camps,' as they are called, passing a dozen straggling cabins with smoke issuing out of the ends, in the middle of little clearings, without seeing a soul, either at work or at play. The fear of starvation makes them work the least possible quantity, while they are much too lazy to play.

Why do not the zealous abolitionists go there and see the experiment in all its beauty? The slave changed into a free, but wretched savage! Why not make something of these thousand negroes? There are not more than two or three families out of the whole who are improved by the change from slavery to freedom.

The two negro settlements are a dead weight upon Brown County, as to any productive benefit from the negro lands, or from negro labor, and that space of country might as well, to this day, have remained in possession of the Indians.

If southern wealth can be applied to buy and colonize among us such worthless population, what farmer in Ohio is safe? Has he any guarantee that a black colony will not be established in his neighborhood?

Let any one who wishes to learn the operations of emancipated negroes, visit the Brown County *camps*. As they sink in laziness, poverty, and filth, they increase in numbers—their only produce is children. They want nothing but *cowries* to make them equal to the negroes of the Niger.

Extract from Wood's Notes on Geology.

STRUCTURES OF CALCAREOUS ROCK BY INSECTS.

From all the testimony we have been able to collect on the subject, it appears that the great southern basin is not so deep as the western.

This would seem the more probable from the fact, that the coral rocks and reefs are more abundant in the Pacific than in the Atlantic ocean. It is known that the animals which form these structures, are scarcely ever found at greater depths than 25 or 30 feet beneath the surface, and yet many of the islands and shoals in the former, are entirely constructed by the labors of these parasites. In tropical climates they encircle entire islands by walls and reefs of their own construction and thus daily contribute to the enlargement of the coasts. A single coral reef, in the vicinity of the Australasian islands, is even seven hundred miles in length.

The quantity of carbonate of lime, furnished by mad-repores and other polypous animals, together with the testacea, almost challenges credibility. Many have been at a loss to understand from whence they derive the materials necessary for the construction of such immense masses of calcareous matter. As sea-water contains but a trace of lime, it is thought they cannot separate it from this fluid, and as they are fixed to the spot which gave them birth, it is impossible for them to bring it from a distance. Lime is known to be an alkaline metal *(calcium)* in union with oxygen; and hence it is allied in structure, to potash, soda, and according to Sir H. Davy, ammonia. The chemist just named, *thought* he discovered a metallic property in some of the salts of the latter article; and hence he infers, that the others may be compounds of hydrogen and azote, combined in different proportions, which we, in the present state of chemistry, are unable to analyze. If this were all true, the formation of lime by animal secretion, admits of an easy explanation. Upon this principle a world might, in time, be formed by these minute *workies* out of air and water! By

whatever process the lime is furnished; it is evident that these industrious parasites are rapidly elevating the bottom of the Southern Ocean. The work is going on there both rapidly and extensively; and millions of minute and immovable beings, are preparing a habitation for animals of a higher grade and different construction.

CONVERTIBILITY OF WHEAT INTO CHEAT, OR CHESS.

To the Editor of the Farmers' Register.

Madison County, Sept. 18th, 1835.

Seeing Mr. Carter's communication in the last No. of the Farmers' Register, stating that his manager had found a bunch of wheat and cheat growing from the same root, and seeing from your remarks, that you are an advocate of the immutability of wheat, and differing from you in this respect, I have been induced to send you the following facts (copied below from the American Journal of Geology, &c.,) stated by G. W. Featherstonhaugh, Esq., a gentleman who stands unrivalled in a knowledge of Natural Science, and together with the opinion of our venerable Madison, ought certainly, Mr. Editor, to be a preponderating weight in the scale of the mutability of wheat. Whilst this question has been so long discussed, I have seen nothing said respecting cheat in flax. I have, Mr. Editor, been in the practice of raising flax for 20 years, and have taken pains to get my seed clear of the cheat seed, (which differs as much from the cheat in wheat, as wheat does from flax,) notwithstanding I have been frequently disappointed in my crop of flax, owing to the quantity of cheat. Why is it that this cheat is found no where but with flax? I do not recollect of having seen a single stalk on my farm away from my flax ground. If flax is seeded too early in the spring, or the flax should receive a check after coming up, there will be a quantity of cheat. I can account for it, Mr. Editor, but in one way—and that is, that the flax degenerates to cheat.

C.

"The opinion continues to be very much encouraged amongst agriculturists, that the heads of cheat or chess, which are often found in wheat fields, take their origin from seeds like those which they bear, and not from the seeds of wheat, which many insist are immutable and undegenerate in their nature. This opinion is a very natural, and perhaps, a very useful one to entertain, as it induces great vigilance on the part of the farmer in the selection of his seed wheat. Having practised farming upon a tolerable extensive scale during the most active part of my life, my opinions as to the immutability of wheat, were long ago shaken. After attending to the selection of seed with the most scrupulous care, and with experimental views, I was too often disappointed when I had the greatest reason to entertain sanguine expectations in favor of the immutability system. Upon more than one occasion too, when I had every possible persuasion, and had seen the spring open upon a fine field, as I thought, of wheat in the grass, I had the mortification to find it shoot up *almost entirely* into chess. The friends of immutability told me that the chess had eaten the wheat out, but they never told me how the chess got into the field, or why the wheat had not eaten it out, which I should much have preferred. However, I sometimes had a great crop of wheat, and perhaps the chess was eaten out upon these occasions.

"Having had a liberal share of agricultural controversy, I am content to let others enjoy their opinions, however distant they may be from my own on such subjects, and do not wish to be thought desirous of encroaching upon a province, which now engages the attention of many able agricultural editors.

"I have a fact, however, to communicate to my botanical and agricultural readers, which ought to have weight in a controverted matter of very great interest.

"Whilst on a geological excursion this summer, in Virginia, at the close of the wheat harvest, Mr. Conway, of Rapid Ann, Madison county, presented me with a plant of cheat or chess, which he had plucked up by the roots from one of his wheat fields. Mr. Conway's attention having been long drawn to the appearance of cheat in his wheat fields, was in the habit of examining plants of this kind from time to time. The plant he exhibited, and which was but recently taken from the field, consisted of four stalks, not in the least broken, and as perfect as when they were growing in the fields. Each of these stalks bore a profusion of the heads of cheat, and nothing whatever that approached, in the least, to an ear of wheat. As far as the heads went it was a perfect specimen of cheat or chess. The plant having been carefully drawn from the field had all its roots attached to it, without any visible fracture, and in the most natural manner. Mr. Conway, however, drew my attention to the skin of the kernel of the seed from which this plant had proceeded, and which was attached to the radicle in a situation quite distinct from the lateral roots. The skin was that of a kernel of wheat, and upon applying a microscope to it, I found that it had been a kernel of wheat, and nothing else; not differing in the least from the skins of wheat seed as they are often found adhering to the radicle of wheat plants, bearing regular ears of wheat when the heads are well formed. This was the opinion of Mr. Conway, who declared himself satisfied from the inspection of this plant, that, in this particular instance at least, *a kernel of wheat had produced a plant. bearing four stalks with ears of cheat or chess.* Mr. Conway informed me, that one or two of his neighbors had found similar plants this summer, and come to the same conclusion, that cheat could be produced from wheat seeds.

"The evening before my interview with Mr. Conway, the apparent convertibility of wheat into cheat was the subject of a long conversation between Mr. Madison (under whose hospitable roof I found most welcome head-quarters during my tour in Virginia,) and myself. We had been old correspondents on agricultural subjects, and we entered into it *con amore*. That venerable man, who at the age of eighty-two, preserves all the vigor of a highly polished and unrivalled mind, related to me the many experiments he had personally conducted in his garden at Montpelier, by sowing cheat to produce wheat, but all in vain, he had never succeeded in prevailing upon it to retract its perverse deviation from its type; and Mr. Madison had paid too much attention to the production of cheat in wheat fields, not to be impressed with the many strong reasons there were to suppose that wheat, which belongs to the Gramineæ, could degenerate into a plant which approaches the grasses. He examined, on my return to his house, the plant which I brought from Mr. Conway's, and expressed himself satisfied that, in this particular instance a kernel of wheat had produced a plant bearing heads of cheat. I still possess this curious plant, and it will give me great pleasure to show it to any agricultural or botanical gentleman who desire to be convinced that I have related the state of this plant faithfully. It appears to me, however, that if farmers would carefully remove plants of cheat at the proper season, after the heads are out, but whilst the stalks are yet green, that the controversy on this subject would soon cease. The single fact I have brought forward, ought to have great weight, and I

have no doubt, that another season will give it all the support it may now appear to want.

"I shall rely upon this fact at present: I shall not attempt to support it by any arguments drawn from the philosophy of plants, or theories of vegetation. There are, however, some very important views which bear upon the economy of agriculture, and are within the scope of this work, which will probably be brought forward in the second volume of this journal.

G. W. FEATHERSTONHAUGH."

For the Farmers' Register.

FOLLOW NATURE.

Wardsfork, (Charlotte,)
Aug. 27th, 1835.

In all our attempts at agricultural improvement, (to succeed) we must follow the indications of nature. Whenever we are in doubt of the way, we should not be misled by every *ignis fatuus* of speculation—but eye attentively the finger of direction on the way-side—for nature has fixed a signpost at every fork, so that the wayfaring man may not err. Man in his inquiries after truth, is prone too much to listen to the suggestion of a theorising fancy—and when the mind becomes vain of its own ingenuity, and amazed with its own reveries, it turns with disgust from the more laborious but more certain pursuit of truth, in the way of observation and experiment. The wise physician, in order to find out the best indications of cure, applies his finger attentively to the pulse, and looks steadily on the countenance of his patient. So should the agriculturist, who has to restore to health a diseased and exhausted soil, apply his nicest touch and scrutinizing look, to the indications of the *vis medicatrix naturæ* of agriculture.

Amid the now noisy clash of discussion, and the conflicting jar of registered essays, the still small voice of practical truth is not sufficiently regarded. Let us lay aside much of speculation and noisy talking, and elaborate writing, and go forth into our fields, with the eye and touch of observation, under the light of nature, and find out, each for himself, where lies the truth. I would not be understood as objecting to discussion, conversation, or written essays on agricultural subjects, where they are not substituted for practice and experiment, and directed too much by a theorising spirit. When properly conducted, they become the reservoirs of tried truth, and the channels for circulating the refreshing and fertilizing water of knowledge through all the desolate and thirsty places of our country.

But to return. If we would catch the true spirit of improvement, we must bow at nature's shrine, and consult her oracles. If we would move onward to perfection in agricultural science, we must invoke her aid. Do you wish to reclaim land subject to injury from water?—notice the natural direction which the water is disposed to take, trace out that course with your spade, and by this simple and sure method you redeem the lost soil, and render it safe and productive. But on the other hand, if you run an awkward ditch without any regard to to the direction of the stream, you incur all the expense and trouble, without any sort of advantage. The simpleton who obstinately slights the indications of nature, will always reap trouble and expense only, for his pains. Do you wish to rear a valuable fruit tree? plant it where nature has said it should grow; and when you come to look for fruit, you shall find it. But if you tear the scion from its proper home with a rash and heedless hand, and force it into a soil and situation uncongenial to its nature, it will not flourish, but die, and its withering branches shall upbraid him with folly who planted it.

When you undertake to turn nature out of her course in any department of her operations, there is a reaction immediately produced—the protecting principle is aroused into action to counteract the effects of this encroachment on her laws. For example: if you throw an obstruction across a stream, the water gathers above, accumulates force, and endeavors to remove the barrier. The weight of the water above, and the fall of the water below, (undermining) both contributing to bring things to their natural state.

Again; you see the same thing exemplified in diking. If too great encroachment is made on the natural boundaries of the stream, by an injudicious embankment, you will be chastised for this violation of nature's laws, by the loss of your dike. Many of the dikes that have been raised of late, have been so injudiciously contrived, that their broken backs and excavated sides will tell to future times the folly of their builders. Where they are constructed with due regard to the natural privileges of the water, they are useful, [but not] where the stream cannot be straightened all the way, or where there is not sufficient fall (when straightened,) to keep the low lands out of the reach of freshets.

Let us observe the indications of nature with regard to the application of manures. Her object seems to be two-fold—to cover soil from extreme heat and cold, and to invigorate the productive principle. The matter used, are leaves, weeds, grasses, sediment, &c. The time of applying is the fall. The part to which she applies, is the surface. It is a little curious how she manages this business, about the time she brings her materials to the greatest perfection. She employs the hand of frost to prepare, and the wings of the wind to scatter broad cast. In the fall, and while the matter rots, the rich juices are trickling into the soil, while the woody parts remain on the surface as a cover to protect against winter cold. I could enumerate many other examples, to show that to succeed in agricultural improvement, we must follow the *indications of nature*—but let these, for the present, suffice.

J. R.

From the Philadelphia Commercial Herald.

SILK.

In every part of our country, attention is wakened to this important and profitable branch of manufacture. New England, however, having taken the lead, seems likely to enjoy for the present nearly a monopoly of the production. A company, with a capital of $200,000 has been formed at Boston, called the Massachusetts Silk Company, which has for its object the culture and manufacture of this article. This company has purchased several tracts of land at Northampton, on which are one or more water privileges, and their factory will probably be erected in that town.

Northamption also contains a silk cocoonery, lately the property of Mr. Samuel Whitmarsh, capable of feeding four or five millions of worms, though the number at present does not exceed 800,000. The building is two hundred feet long and two stories in height. It is filled with ranges of sliding drawers of twine lattice work, on which the worms feed, and these are intersected by alleys, so that there is abundance of both air and light.

The New England Silk Company has likewise been formed at Boston with a capital of $100,000. Their manufactory is under the superintendence of Mr. Cobb of Dedham, whose works the company have purchased. It is wholly dependent at present on foreign culture for its supply of material, and is compelled to resort to the manufacture of articles in which silk is only a component part.

The Connecticut Silk Factory at Hartford, has a capital of $100,000. Their building is furnished with 100 looms, and preparatory machinery to be moved by a steam engine of eight or ten horse power. The want of stock compels this factory also to the production of articles in which the proportion of silk to the other materials is small. There is also a factory in progress at Poughkeepsie, N. Y. At Concord, N. H. a farm has been purchased for the cultivation of the mulberry.

The establishment of the Valentine Company at Providence, R. I. now sold to a company from New York and Boston, includes a plantation, containing 30,000 trees, from four to five years old, and from six to eight feet in height. It is supposed, that for the next five years this plantation will yield an average product of half a pound of silk to a tree. This company has also manufactured a considerable quantity of silk goods, and fitted up a building 30 feet by 90, three stories high, to be exclusively devoted to this branch of manufacture. The machinery is carried by steam. A trial of the power loom in this factory has proved that it will answer as well for silk as for cotton, and that, with experience in its management, it will probably turn out as many yards of the former as of the latter. A silk society has been formed at New Haven.

To encourage the production of this article a bounty has been offered by the state of Massachusetts on reeled silk, and by Connecticut both on this and on the trees themselves. The natural advantages, however, for the production, must of necessity, be greater in the middle and southern states.

The wild mulberry exists in abundance in Virginia and Mississippi, and in the forests of the latter state, silkworms are found growing spontaneously. The native tree, however, is not found to produce silk of merchantable quality. It is thought that by engrafting scions of the white or Italian mulberry into these wild stocks, a tree will be produced of hardier growth, and less liable to injury from atmospheric changes.

We are indebted for the above information to the Silk Culturist, a monthly publication, commenced in Hartfold in April last, the pages of which are principally devoted to this interesting topic. To those engaged in the cultivation of the mulberry, the instructions contained in this periodical must be highly valuable. From the novelty of this branch of agriculture among us, information in regard to its details is peculiarly needed. The journal is published by an association called the Hartford County Silk Society, and furnished to subscribers at 50 cents per annum.

THE NATIVE MULBERRY FOR SILK WORMS.

The foregoing article shows at a glance that the people of New England are about to make silk culture a large and important branch of their rural economy. It is there no new and untried speculation. The business has long been pursued in Connecticut, and with results so satisfactory as to induce these recent and far more expensive investments for the same object. If good profits can be there made, in the cold and unfriendly climate of New England, (where it is yet a problem to be solved whether the best species of mulberry can stand the winter's cold,) how much more profitable would the business be in Virginia and the more southern states? Our *cheaper* slave labor would also afford advantages, and many aged or infirm hands could be profitably employed in this business, who are now a useless expense to their owners. Much land that yields no net profit under usual crops, would serve well for mulberry trees.

The opinion expressed above of the worthlessness of the native (black or red) mulberry tree, for yielding silk, is as general as it is erroneous—and the error (though of use to nursery-men,) is very injurious to the community, in causing all efforts in silk making to be postponed until mulberry trees can be reared. Now, though professing to know very little of silk culture, we will venture to assert that those who can *succeed well* by using leaves of the white mulberry, will not *fail*, nor do a much worse business, with the black. The black is doubtless somewhat inferior to the white mulberry, as this is to the Chinese: but the difference of products from either two, would not be so great as would be made by the difference of care and management of almost any two new silk growers.

Dr. Wm. I. Cocke of Sussex, Va. some years ago fed some silkworms on the leaves of the common mulberry, and others on those of the white, and prepared sewing silk from each kind. It was either his first or second year's trial of the culture, and on a small scale, and of course attended with all the disadvantages of a new beginning, independent of any inferiority of the kind of food used. He sent specimens of the silk from the common black mulberry to Mr. Du Ponceau of Philadelphia, who, in conjunction with Mr. D'Homergue, was then writing to urge the undertaking of this business. The specimen was considered by the latter as so excellent, that he at once pronounced, in the presence of the gentleman who carried it, that it could not have been the product of the native mulberry. The bearer of the specimens, however, was enabled to declare the contrary, he having been during the time, a member of Dr. Cocke's family, and acquainted with all the circumstances of the experiment. Still no subsequent allusion was made to this circumstance, though it was so well calculated to encourage early and general efforts—and probably, because of some lingering remains of doubt of the correctness of

the experiment, or the statement, the results being so different from received opinions.

But while we advise those who wish to rear silk-worms to use the native mulberry trees, if they are ready and convenient, we also recommend to them the immediate planting of a better kind, and especially of the new Chinese, (or Morus Multicaulis,) for future use. If there is doubt whether this valuable tree will thrive farther north, there can be none here—and as it furnishes undoubtedly the most abundant and nutritious food, and as the silk business *must* extend rapidly, every acre of land now, or soon, planted with cuttings of this tree, will be almost sure to yield a highly profitable crop, either for sale or for use.

From the Baltimore American.

MACHINE FOR FELLING TREES.

A most valuable invention has lately been made by Mr. James Hamilton of New York, which will be the means of saving an immensity of labor in this country. It is a machine for *felling trees*. The New York American gives, from the New York Mechanic's Magazine, a description of it, accompanied by a drawing. This machine requires very little more space for use than is required for the swing of an axe, and may be used in almost any situation in which a man can use an axe. It may be moved from tree to tree by one man, who can with it cut through a stem of two feet diameter in five minutes: two men will, however, work it to more advantage. It is so constructed as to admit of saws of different lengths according to the size of the tree. A committee of the American Institute at New York commend it in strong terms. It cuts the stumps uniformly of an equal height, and at least a foot nearer the ground than is usual, whereby the most valuable part of the timber is saved, besides all the after labor of squaring the end. The cost of the machine is about $50, and it is believed that with it two men can fell as much timber in a given time as twenty can with the axe.

INQUIRY ON SWAMP MUD. TWIN CORN.

To the Editor of the Farmers' Register.

Cypress Spring, Essex County, Sept. 21st, 1835.

I am now about commencing an experiment with swamp mud as a manure, and should be glad to get information upon the subject from some one of your correspondents, as to its effects, and the best mode of applying it.

I was induced from reading the address of James M. Garnett, Esq. to the Agricultural Society of Fredericksburg, recorded in your paper, (No. 8, Vol. II.) as well as from his personal recommendation, to make trial of the twin (or as he calls it extra-prolific) corn, and obtained from Maryland a barrel, about two bushels of which I planted, some on inferior high land, and some in low ground. It has succeeded beyond my expectation; every stalk has two, three, and frequently four and five ears, not large, but I think two are more than equal to one ear of the corn commonly planted with us.

PETER J. DERIEUX.

IRISH POTATOES—MANGEL WURTZEL, &c.

To the Editor of the Farmers' Register.

Accompanying this communication you will probably receive a few Irish potatoes, and a part of a mangel wurtzel beet, indicative of its size, which I transmit you as a prelude to my method of cultivation, &c. Although there is nothing in it variant from that pursued by many, (except perhaps its imperfections resulting from a want of skill,) I have thought its publication might be profitable to some, while it certainly cannot be injurious to any. There is scarcely any culinary vegetable which exceeds in value the Irish potato, on account both of the quantity of product, as well as the duration and easy preservation of which it is susceptible. The whole *modus operandi* in managing the early crop, is I presume, well understood. It is the late or second crop, to which I wish to call your attention, as both combined, furnish a supply of this delightful vegetable throughout the year. The plan which I have adopted (in imitation of others,) is simply about the middle of June to hill up my tobacco patches, after the plants are drawn, and to deposite a whole potato in each hill: one weeding, and two hillings, usually complete the whole process of cultivation. A statement of the quantity which may be thus produced on suitable land, would almost "invite incredulity" unnecessarily, as it is my only object to induce experiment. We know that Ireland is most celebrated for the quantity and quality of its potatoes—and as soil and climate are amongst the chief agents of vegetation, its success may be fairly attributable to a peculiarly suitable combination of each. The system under discussion, secures its low moist soil, and cool autumnal climate in which to ripen. Then with the assistance of both the principal agents, why cannot we be equally successful? The last season was rather wet for them—though from the size of those I send you, (from 12 to 14 inches in circumference,) you would probably not consider it desirable for them to be larger. It is not the size however, so much as the double crop, and consequent supply through the whole year, which recommends this method of cultivation. Their preservation through the winter is a source of no difficulty whatever. The day on which they are dug (as early as convenient after the first killing frost,) they may be transferred to an elevated spot in the garden, and deposited in a hole two feet deep, and as wide as desirable. Over them a mound of earth should be raised in a pyramidal form, so as to prevent the penetration of moisture. In this way they may be kept perfectly sound and fresh through the winter. On the approach of warm weather, in March, they should be removed to a drier and more elevated place, to arrest vegetation. Those intended for seed should be spread, as the fermentation incident to a close heap, might destroy their vegetative property. It is not by any means essential that they be confined to plant-patches. I only use them because they are fit for little else the first year. Some of the largest I made this year grew on land which had been repeatedly tended in corn—but similar in other respects.

The mangel wurtzel (which measured 23 inches in circumference when growing,) was planted about the first of April, in land which had been ploughed deep and coultered—laid off in trenches two feet apart—and the coulter run twice in the bottom of them. Manure was then thinly spread in the trenches, and mixed with the dirt, over which the seed were drilled quite thick, and afterwards thinned to about eight inches. The subsequent cultivation was performed with the coulter and hoe. Mr. John Hare Powell published a statement (vouched by a number of certificates,) that he had produced (according to my present recollection,) at the rate of sixteen hundred bushels to the acre. It is eaten voraciously by hogs when thrown immediately from the patch—though its nutritive qualities would no doubt be greatly enhanced by boiling. It affords a very convenient and profitable substitute for corn, when the resources of the harvest field begin to fail—and is easily preserved through the winter. I have not sent you the above mentioned specimens by way of boasting of their superior size, nor of any skill or originality in their cultivation, but merely to show you the results that may be easily attained without either.

E. G. BOOTH.

Shenstone, Oct. 16, 1835.

For the Farmers' Register.

OBSERVATIONS ON THE LOW WAGES OF FEMALE LABORERS.—No. 3.

[Concluded from page 381.]

In the two preceding Nos. I have stated at some length, the grievances of laboring females, and traced the effects from causes that lie in the institutions, habits, and prejudices of society. It is now my purpose to treat of remedies for these enormous evils—and for this, I feel, and readily admit, the inadequacy of my powers of devising the best plans, or for persuading others to act on my suggestions. Would that I could awaken the zeal, and engage the influence for this great and benevolent undertaking, of some of those who are able to imitate the examples of a Howard, a Wilberforce, or of the far more admirable Oberlin! And how much does this work surpass in value and importance, the objects of either of these illustrious philanthropists! It is not so partial a good as merely to alleviate the sufferings of the suspected or convicted felons which filled the prisons of Europe—or of the savage inhabitants of Africa, whose condition at home was often as deplorable as the horrors of the middle passage, and of West Indian slavery—nor even as grew from the enlightened and noble works of the heavenly minded Oberlin, which were limited by his position to a narrow compass, and which were doomed to end almost as soon as his own life and labors. Far above all these would be the benefit of properly employing and fairly compensating female labor. It would be rendering justice, (which has so long been withheld,) to all the poor of the purer and better half of the civilized human race—and these are not strangers, and separate from ourselves in interest: the class of sufferers includes our countrywomen, friends and valued associates—it *may*, and very probably *will* hereafter include some of the near and most beloved relatives or connexions of all who may read these remarks. What benevolent object then, is more worthy of the aid, and of the zealous efforts of the philanthropist, the patriot, and the christian?

Females are naturally as well suited as males to perform at least half the mechanical labors which are now principally or entirely executed by the latter. For very delicate operations (as, for example, parts of the business of engravers, watchmakers, and printers,) they are even better fitted. For some other situations in which some mental power and education are required, as well as mechanical skill, women are at least as well qualified. It is not necessary to particularize these employments to show that there are plenty to engage all the labor of females who would need to resort to them. There are even employments for women which might well engage the rich, the educated and the refined—and in some other countries such women are so occupied. In France, not only the retail shopkeeping is generally in the hands of women, but the wife of a merchant of the most extensive business is often his best assistant, and efficient and enlightened partner in trade.

The first remedial measure for the existing artificial and unhappy position of women, which especially prevails in this country, is, that every individual, of either sex, who is sensible of the evil, should lend his individual countenance and support to the proper employment and fair compensation of female labor, and to the shaking off the existing prejudices which oppose so many obstructions to its exercise. A very partial exertion of this moral force, would render much service. But the evil is too old, too deeply rooted, and widely extended, to be removed by individual efforts alone. Society has raised the barriers—and society, or the organized and continued action of many individuals, only can level them. With these views, I will propose the outlines of a plan for combined action, which, however partial in effect, may serve to commence this good work—and may suggest to others better means for attaining the great object in view.

Besides the exercise of individual influence and effort for the same end, it is proposed that there should be formed in each, or any one town, or community, an *Association for encouraging the employment, and increasing the remuneration of female labor*—to be composed of all persons of both sexes who concur in approving the scheme. It should not be attempted to increase (by direct means) the compensation for existing employments, however small it now may be—(the objections to which attempt have been stated in No. I.—) but to create and increase new employments, which, if effected, would ultimately, and by proper means, serve to increase the compensation for the old. as well as the new. By discussion and by publications much might be done to awaken numerous other individuals to the importance of the design, and to engage their co-operation. The association could effect much by the promise of the preference of its members in dealing with those tradesmen who employed female apprentices or laborers, (upon proper and fixed stipulated terms,) and especially in cases where some of these apprentices were the daughters or other near relations of the mechanics or merchants who employed them. The latter circumstance would have two very important effects in the commencement

of so novel a state of things—1st, to ensure the most perfect state of propriety of manners and moral *habits* in the several private establishments where female apprentices were admitted—and 2ndly, to engage the strong influence of parental feeling in sustaining the respectability and good reputation of these establishments.

But though such measures, judiciously executed, would engage in this good work many tradesmen by the strong tie of self-interest, and the prospects of pecuniary gain, still there might be others who would oppose and obstruct the reformation —either from short-sighted and mistaken views of their own future profits—or because (as in the case of the tailors,) they would be deprived of the unrighteous harvest which they now derive from the degraded and wretched state of female laborers. To guard against either or both these causes of opposition, and possible failure, the association might use another and still more efficient means. This would consist in establishing (in conjunction with individual undertakers, or otherwise,) workshops to carry on the whole business of any particular branches of trade, that might be considered the most suitable for female labor, or which embraced the smallest portions for which male labor was indispensable. These more public establishments should be, of course, under the general direction and control of the association, and so organized that every proper care could be taken to maintain the purity and correct conduct of the inmates—and that a portion of the time of the apprentices should be given to mental and moral instruction, and to the performance of those household duties which all women should be acquainted with.

The most suitable business first to be undertaken in such an establishment, of course would be that of the tailors—who may be considered as the natural enemies and oppressors of laboring females. Even now, women actually perform a large part of the work for which tailors are employed and paid—and for a mere pittance of the price obtained by their employers—and women are now well prepared, and sufficiently skilled, to execute the whole of this work, with no other loss to the community than that our coats would not at first fit so well as to satisfy the practised eye and exquisite taste of a dandy. But even this trivial objection could be easily removed. One male measurer and cutter of men's clothes would be sufficient for an establishment of more than twenty female tailors—and there is no reason why such an assistant might not be employed by the female head of the shop. Even if this one branch of the business should necessarily remain in male hands, it would compel nine-tenths of all the future race of male tailors to seek more manly employments—and would double the present small demand for, and miserable compensation of women. If this change bore hard on the present race of the knights of the thimble, it would be the only case—and there is no class, the members of which would so well deserve to bear some of the privations which they have so long inflicted on others. It would be well if public opinion could entirely root out this business, so unworthy of *men* —and as exercised by men, so injurious to women.

Another mechanical employment which seems well suited to females, is printing. Women could make more skilful compositors than men, and would be able to do more of that kind of work in the same time. This principal part of the labor requires not strength—but quickness of movement and delicacy of touch. This part of the business too might be conducted in an apartment quite separated from the other parts of a printing establishment, and therefore there would be no need of bringing together different sexes, or different classes. But even this seclusion would be unnecessary—as one master printer, as head of the establishment, and one pressman, would be as many males as would be needed in an office in which eight or ten hands might be employed. Greater or less facilities for employing females in a manner altogether unobjectionable, may be found in various other kinds of business: but these examples will be enough to mention here.

Of course many male laborers and mechanics (in the spirit of "trades' unions" and of "strikes,") would cry out against every effort of this kind, as calculated to deprive them of employment. But this clamor would be groundless. Except in the tailors' trade—to which many women have already served a long and laborious apprenticeship, and are fully competent to earn journeymen's wages, without having yet been permitted to do so—there would be no immediate loss of employment to any males—nor any future loss, unless it was their own fault. In most or all other pursuits than that of using the needle, females could only be received as *apprentices*, and of course no more girls would be taken, than would be required by the demands of trade, and whose places would (without this scheme) have been filled by just so many boys. The difference of sex in apprentices hereafter to be received, could in no way affect the demand for, and employment of the present race of journeymen mechanics, even if they continued as journeymen, and unmarried. But every sober, industrious and capable journeyman, in 7 or 8 years will probably be either a master workman, or a married man, or both—and in either condition, he will be benefited by the success of the scheme of employing women. As a hirer of their labor, he would be better and more cheaply served—and he would have a sure resource to save his young daughters from the danger of future want and misery. Girls would generally be more valuable as apprentices than boys, because the latter are more likely to be disobedient, vicious, and unprofitable laborers. As independent laborers, after serving through their apprenticeship, females still (at least for years to come,) would be hired at less wages than males—and the difference would be a great profit to their employers and to the public, while even at that reduced rate, they would earn four-fold what is now obtained by them, in their only employment of sewing.

It may be said that if so much advantage and profit are promised by employing female apprentices, why may not the plan be safely left to individuals to adopt and execute? It is because no one individual could give sufficient assurance of the stability of his purpose, and permanency of his plans, to induce parents to confide their daughters to his charge, and to risk the prosperity of their lives on the issue of an untried, and therefore extremely doubtful experiment. Hence the necessity of the support and guaranty of an association

of many individuals. It would not be their money that would be wanted—or at least but little, and that only in the commencement—but the support and strength furnished by their favor, and their influence with the public. A master printer and publisher, for example, who would take a dozen female apprentices, could not fail to make sufficient profit, provided he was merely assured of having enough work furnished to him, at fair prices, or of sufficient demand for his publications. But without an assurance of full employment, he could not justifiably, assume such duties, and such heavy responsibility, nor would he be trusted by others with so delicate and important a charge. Give such individuals however, the backing of a permanent association, and these difficulties would be removed—not speedily perhaps, but surely, and effectually.

We are a people slow to abandon old usages, and it is to be feared that it would be long before any considerable change in labor could be produced even by zealous and well directed efforts for the purpose. More especially would it be dfficult to induce the parents and friends of young girls to adopt for them such novel measures, even though heartily approved by them in theory, lest there should be a failure in the attempt, or some loss of *caste*, and even of character be sustained, from improper company, or from unfounded popular prejudice. These objections, these fears, would proceed from feelings that deserve all respect and indulgence—they would be excited by the general purity of our female population, and by the keen sensitiveness as to the most distant approach to any thing like a stain on female character. Long may these feelings exist! It would be the care of the members of the association to cherish them—and to take every care to treat with attention and respect the young females who may be trusted to their guardianship. This could be easily and completely effected. The working establishments under their patronage, might be as well organized to secure purity of morals, and propriety of manners, as the best boarding schools—and every apprentice might be made sensible, by the kind notice of the ladies who were members, that their labors were as honorable, as idleness and dependence would be likely to lead to want, and degradation.

It may be objected to this scheme, that as soon as a female apprentice had served her time, and was capable of earning good wages, that she would often become a wife and a mother, and then be compelled to renounce her acquired trade. Even were this to be the case, there would be no loss sustained greater than is now general. The female would have been at least well employed, for the interest of others, for some previous years, and would probably have acquired habits of industry and economy, which would be valuable in any condition of life. But this worst case would not be so frequent as others of very different character. Young and poor females often marry on the first tolerable opportunity, and most imprudently, not so much from inclination, as to gain a home and asylum from dependence and threatening want—and without considering that the step is almost sure to bring greater future want and misery to themselves and their children. Now the acquiring of a good and gainful trade would make a girl at once independent—and would be doubly a safeguard against her marrying without proper motives, or very hastily and imprudently. At any rate, it would be a strong inducement to postpone marriage until the wages of a few years had been accumulated—and thus the evils of imprudent marriages would be greatly lessened, if not often avoided altogether.

If such measures as have been proposed, could be used, and had the effects anticipated, the results would not be more important to the interest and happiness of women, than to society at large. The many thousands of young girls who will otherwise grow up to live, like their predecessors, in dependence, and destitute of the common comforts and even of necessaries, would be made independent of the charity, or of the oppression of others, and would possess within themselves the sure means of earning a competent and respectable support. There would be removed the now existing powerful inducements, (amounting often to necessity,) for many a mercenary marriage—which, whether the object be a life of luxury and splendor, or merely to secure bread under the shelter of a hovel, is simply a species of legal prostitution. The laborious father who had necessarily lived "steeped in poverty," to support a large family of young children, in dying, would be relieved of the heart-rending conviction which must now exist, that his daughters would be destitute except from the charity of friends, or of strangers.

By the change of position contemplated, woman would rise in the scale of society, and in dignity of character, as much as in comfort and happiness. She would be a substantive being—no longer a mere adjective to and dependent on man, whether situated as his valued companion and sharer of his toils and pleasures, or the mere object of his sensuality—as the pensioner on his bounty, or the slave and victim of his selfish tyranny. Nor, by this change, would there be any loss in the value of woman, as the solace, and best of all the blessings of man: on the contrary, she would become so much the more prized, so much the more a dispenser of happiness as a companion and wife, in proportion to her advancement in useful pursuits, and to that increase of knowledge and enlargement of mind, which would necessarily follow such pursuits.

The men, who would otherwise have occupied the places which this scheme would give to females, would be engaged in other pursuits requiring the strength, (physical or mental,) the energy or the enterprise of the stronger sex. In our young country there can be no want of demand for services in all such pursuits; and of course no loss, private or public, by the change of occupations could be expected to occur.

To the commonwealth, to the public interests, the gain would consist in the change of many thousands of unproductive consumers, to productive and profitable laborers—the obtaining, in fact, the fruits of the advantageous employment of half our population, which now may be considered (as to the public interests) as a class of paupers—which take away much from the public wealth, and return no compensation, except as *breeders*, and reproducers of the class of male laborers, which existing institutions and prejudices have made the only productive class.

POLECON.

SCRAPS FROM OLD AUTHORS RESPECTING VIRGINIA.

To the Editor of the Farmers' Register.

I send you some notes on the natural history of Virginia—Indian words, &c., taken principally from the old histories of Smith, and Beverly, and Stith. Smith you know writes in the uncouth simplicity of a soldier; and Mr. Jefferson has said that Beverly is as much too concise and unsatisfactory, as Stith is prolix and dry.

Indian words.

Putchamins—Persimmons.

Pawcohiccora—Milk of walnuts.

The Indians beat hickory nuts or walnuts—mixed water—when it looked like milk—hence they called cows-milk, hickory.

Maracocke—A fruit like a lemon. This is the fruit of the passion flower.

Popanow—Winter.

Cohonk—Winter. Cohonk was the cry of wild geese, whence it was applied to winter.

Cattapeak—Spring.

Cohattayough—Summer..

Messinough—Earing of corn.

Taquitock—Fall of leaves.

Ponap—Meal dumplings.

An old writer says the *pone*, a favorite corn meal bread in Virginia, is not derived from the Latin *panis*, but from the Indian *oppone!*

Ustatahamen—Hominy. Lord Bacon calls this "cream of maize," and commends it as a most nutritious diet. The Indians also made bread of the sunflower seed.

Macocks and Cushaw—Names for the cymbling—called by the Indians of the north, squash—which is an *onomatapeia.*

Messamins—Muscadine grapes.

Chechinquamins—Chinquapins.

In the botanical department, Beverly had met with the following:

Three sorts of cherries.

Persimmons.

Three sorts of mulberries.

Two sorts of currants.

Three sorts of hurts or huckleberrys. It seems in his day they knew no such word as whortleberry, made since to puzzle the wits of school boys.

Cranberries—probably the same with Captain Smith's rawcomens.

Wild raspberries—probably blackberries, and the wild strawberry.

Nuts—chestnuts, chinquapins, hazel-nuts, hickories, walnuts.

Six species of the grape.

The honey tree—sugar tree—the maple. The Indians had made the maple sugar time out of mind.

Maycocks—maracocks—lupines.

Myrtle-wax—out of which were made candles without grease, never melting, and exhaling a fragrant incense.

Puccoon and musquaspen roots, with which the Indians painted themselves.

Sumach and sassafras.

Jamestown weed—"a great *cooler.*"

Flowers—The crown imperial—The scarlet cardinal flower—Magnolia glauca, and liriodendron tulipifera.

Of Indian corn, four sorts.

The tuckahoe—a tuberous root growing like the flag in marshes. There is a place of this name in New York, and a creek in Virginia, the people living east of which are termed Tuckahoes, as those on the west are styled Cohees.

The Indians had no salt but what they found in ashes. They were exceeding fond of roasting-ears. They had dried peaches.

Perhaps our Virginians are not aware that their ancestors amused themselves catching wild horses. They hunted them in the uplands. But it was unprofitable sport—more tame horses killed, than caught of the wild.

1699. Eight hundred Huguenots settled in Monocan town, south side of James River, 20 miles above Richmond. They attempted to tame buffaloes, by catching them young. They also made a strong-bodied claret wine of wild grapes.

Prices current in Virginia in 1703.

Beef and pork, from	1*d* to 2*d.*
Poulets,	6
Capons,	8 to 9
Chickens,	3 shillings a doz
Ducks,	9 a piece.
Geese,	1 shilling.
Turkey hens,	18
Turkey cocks,	20
Deer,	10 shill. a head.

In the time of Beverly, oysters and wild fowl were the cheapest food going—ducks so plenty, that the historian, though a poor shot, killed twenty at a bang.

For sauces they used red buds and sassafras.

But withal they were so lazy and good-for-nothing a pack as to send home to England for cabinets, chairs, tables, stools, chests, boxes, cartwheels, bowls, and birchen brooms. Just so their lazy and good-for-nothing descendants send to the north for the same articles.

Beverly calls it a happy climate, near the same latitude of the land of promise.

Judea full of rivers: so is Virginia!

Palestine possessed a great bay and sea: so does Virginia—a fertile soil: so does Virginia. And mine [author] concludes that where the Creator is merciful enough to work for people, they never work for themselves.

He adds that Virginia lies in the same latitude with Canaan, Syria, Persia, India, China, Japan, the Morea, Spain, Portugal, and the Barbary States. But here follows the cap-sheaf of eulogy. "If people will be persuaded to be temperate and take due care of themselves I believe it is as healthy a country as any under heaven; but the extraordinary pleasantness of the weather, and the goodness of the fruit, lead people into many temptations. The clearness and brightness of the sky, add new vigor to their spirits, and perfectly remove all splenetick and sullen thoughts. Here they enjoy all the benefits of a warm sun, and by their shady groves are protected from its inconvenience. Here all their senses are entertained with an endless succession of native pleasures. Their eyes are ravished with the beauties of naked nature. Their ears are serenaded with the perpetual murmur of brooks and the thorough-bass which the wind plays when it wantons through the

trees—the merry birds too join their pleasing notes, to this rural *consort*, especially the mock-birds who love society so well, that whenever they see mankind, they will perch upon a twig very near them, and sing the sweetest wild airs in the world; but what is most remarkable in these melodious animals, they will frequently fly at small distances, before a traveller, warbling out their notes several miles on end, and by their musick make a man forget the fatigues of his journey. Their taste is regaled with the most delicious fruits, which without art, they have in great variety and perfection. And their smell is refreshed with an eternal fragrancy of flowers and sweets—with which nature perfumes and adorns the woods almost the whole year round. Spring and fall in Virginia afford as pleasant weather as Mahomet promised in his paradise."

C. CAMPBELL.

Somerville, Ala. Sept. 10, 1835.

[The foregoing notes gathered by our friend and correspondent from old authors, will probably be new as well as amusing to much the greater number of our readers. We had long ago marked, for future publication in this journal, the whole of the descriptive part of the account of Virginia, by its true founder, John Smith—and it has been prevented by the want of vacant space for so long an extract—the great care necessary to copy faithfully its ill spelled old English—and also by an unwillingness to dismember a work which deserves so well to be given entire. It is a work not only curious and valuable for its manner and subjects, but as being written by one of the most remarkable men who have ever lived. A modern edition (of few copies, and therefore of high price,) of Smith's "Trve Travels, Adventures, &c." was published (in Richmond) and at a loss, as we are sorry to learn. If the demand of individual purchasers cannot induce, or pay for, re-publications of these old historians of our country, the object well deserves the patronage of the government of Virginia. A few thousand dollars would serve to publish cheap, but perfect editions of Smith, Beverly and Stith—which are now known to very few; and indeed the two latter would be lost, except for being preserved in a few public or private libraries.]

LARGE PRODUCTS OF SMALL FARMING.

To the Editor of the Farmers' Register.

While you are crowded with communications from *men*, upon the all important subject of agriculture, I hope you will pardon the intrusion I hereby make in detailing the following crop, made by a Chesterfield *plough boy*.

I was left, at the tender age of 15 years, by the death of my father, the sole care and support of my mother and six children, all younger than myself. At my father's sale all his servants were hired out, and I hired one—for keeping which, I was allowed by the estate $23. The only service he was able to render, was to keep us in fire wood and weed the garden. The sale took place at Cobb's on the 14th of April 1825, at which time, I had about three days ploughing done. The reason of my lateness was, that I expected to move away, and only decided to stay about the 1st of April. My stock consisted of a colt, three years old, two young cows, one sow with six young pigs, a yoke of oxen, two carts, two ploughs, one wooden harrow, three hoes and one spade. My provender being scant, I resolved to help it out, by a grazing lot, and accordingly fenced in one of one acre of clover, and thus equipped, I commenced my crop. I listed up seventy-five to eighty thousand corn-hills of land, crossed it with a trowel hoe, and my little brother, five years and six months old, and two sisters, older than myself, planted the corn while I ploughed. I had besides, a horse and plough one day, and two hands to plant after it, which was all the help I had during the crop.

I laid off one and a half acres and planted it in sweet potatoes, cotton, Irish potatoes, melons, and other necessary vegetables. I broke up the balks between the corn while it came up. My kind and friendly neighbors proved Job's comforters to me: for all predicted my failure. * * My plan for working and feeding was formed by necessity. Knowing that if I did no more work than my neighbors I should be "run away with grass" I fed the horse on corn after, or at night, and as soon as it was eaten I put him in the clover lot. As soon as it was light enough to see, I hitched up and drove briskly until breakfast time—took out and fed while I ate, and for which I only allowed forty-five minutes—worked till one o'clock—rested an hour and a half when cool, two hours when warm—when very warm, two hours and a half, sometimes three hours. I would then hitch up again and drive as long as I could see to keep off of the corn. I cultivated my crop entirely with the plough, rejecting the hoe, except to replant, from necessity. I soon saw that my corn outstripped that of my neighbors. I looked on with astonishment. I laid by my crop with the dagon plough, and had finished to about eighteen thousand hills, when the weather grew dry, and at the earnest entreaty of my neighbors, who saw the corn twist up after every furrow, I stopped; and thus I found by listening to them, much against my own judgement, I only made about two-thirds as much on that part, as I did on the other, besides the loss of much fodder, as that fired, while the rest kept green even to the last furrow.

I began to use my new corn about the 10th of September. The hogs got into the field and destroyed about four barrels. After using from it all fall and winter plentifully, and fattening six shoats, it turned out as follows:

Sold at the door	20	barrels at	$3¼		$65 00
" "	20	" "	4		80 00
Petersburg	15	" "	4½		67 50
" "	13	" "	5		85 00
" "	5	" "	6		30 00
I raised 200 lbs. of cotton, for which I got 25 cents per lb.					50 00
Got for fodder, tops and shucks					53 00
150 bush. sweet potatoes at 40 cts.					60 00
Six shoat were worth - -					21 60
Sold melons, turnips, &c., which brought me - - -					20 00
Bought 10 bushels wheat at 75 cts., and seeded it—and sold it at $1, and the same for seeding, and made by the job, net - -					12 50
					544 60

From which, deduct hand hire for getting fodder, - - -	10 60
	$534 00

The time I was employed about it was about seven months, and my labor yielded me at the rate of, or about, seventy-six dollars per month. I do often fondly look back upon that year, and all looks like the work of magic. Truly the God of nature was with me, though I knew it not.

N. B. My Irish potatoes turned out less than the seed I planted. I thought that the more I ploughed and worked them the more I would make, and consequently, worked them about eight times, and found, to my astonishment, that I had the finest vines I ever saw, but no potatoes larger than a partridge egg, or thereabouts—and they few and far between.

J. L.

ANOTHER COLT FROM A MULE. MARL AND MARLED LANDS.

To the Editor of the Farmers' Register.

Spring Hill, Nansemond County, 17th Sept., 1835.

Permit me to record in your Register, the birth of a second mule colt of mine, on the 13th of August, 1835. The same mule brought a fine female colt, jet black, save a star in its forehead, and one foot white. It partakes, as did the other, more of the horse than of the mule, and is a much finer colt. It can be seen in my pasture by any and every one.

I really should like to be informed by you, how it is that you have made such good corn, as I saw the other day, in that old field just above Mrs. Gary's: I suppose by marl and proper management.*

Last fall I sent to Baltimore for 30 bushels of wheat to seed 30 acres of land, 20 clover lay and 10 after oats. I got but 24, and fearing that I should not have enough, I directed my old man to make it hold out. He only sowed 21 bushels, and I made this year therefrom, near 500 bushels. The clover lay averaging 20 to the acre, and the oat land not 10; so that you see, I made about 25 bushels for one bushel sowed. This wheat has been made, first, by the use of marl, then some manure, which produced the clover, and finally, the wheat has been made. Twelve years ago this land would not have produced five bushels of wheat to the acre. It not only now produces wheat, but every thing else in proportion. Yes, sir, and such are the means within the reach of many, very many persons in old Nansemond, to improve their worn out land; and believe me, they discard them. I do not mean *all*—for we have some few noble spirits in the good old cause of improving the soil—and would to God that we had more; for our whole tide water country is filled with marl, more or less deep under the earth. Several years ago, in digging a well in the Dismal Swamp, eight feet below the surface, a fine bed of marl was entered. It is evident to me, that our whole country abounds in it more or less; and that it is of use, when properly applied, I think no rational man will gainsay, but it requires great exertions to bring it into use. A circumstance happened in my neighborhood of more service to our cause, than all the talking that you and I could do. Many of my neighbors had been laughing at me for years, when at last, I prevailed on one of them, a very amiable man, but very poor, to use a little marl upon his poor old field. It made such a difference in the crop, that all became at once convinced, and are now trying to get it. Sir, we must improve our lands, and as *we* have the means of doing it, why should we leave our native country, for the south and the west? That country, or a large portion of it, must in time be worn out, and then there is no possible means of reclaiming it. It must be exhausted from the nature of things. So much is now made, that the proprietor or occupant of the soil, are flushed with success, and never stop to look what will be the result at a future day. But poor old Nansemond, that has heretofore stood at the lowest possible ebb, begins now to hold up her head. With some as fine land as any in the world, if the water was taken off, (and that is fast disappearing or lessening every year, from various causes,) with marl and lime all in reach, and ample means of acquiring manure —with easy means of access to good markets, and land very cheap, why should we, I say, go south or west? No! let those who dream and speculate in visions, go—let others, that I could name, go—but let those who live for others, as well as themselves, and who are desirous of improving the soil at home, remain. I, sir, do verily believe, (while I candidly confess that all my feelings are in the mountains of Virginia,) that the country from Suffolk to Norfolk will, in the course of time, be the garden spot of the union, so soon as the timber is gone, and the water removed, (which might easily be done, but the way I shall not here point out.) The timber is fast falling before the axe, and the water is fast disappearing. The health of the country will then improve—and with good land, the ample means of improvement, and a market at our door, why should not the country be filled up? It will—it must be. So, I say, with all my prejudices in the mountains, (for I am of mountain birth, or so near so as occasionally to feel the bracing north-west wind sweeping over those romantic hills, the beautiful scenery of which must delight any man, that is not dead to the feeling of all nature, and whose very soul is not wrapped up in the visionary schemes of the golden region—) I say, with all my feelings in the mountains, I am constrained, and must say, that we down here, (as Jack Downing would say—"down east,") have advantages that few possess. And already have our lands begun to attract the attention of some very well informed gentlemen—for they see clearly that while we have disadvantages, yet we have many, many advantages—and show me, sir, if you can, the place that has no disadvantages.

Before I close, I will tell you what a southern gentleman told me and others lately. He is a great advocate for all going south. He acknowledged that since he had been to the south (22 or 23 years,) that he had completely worn out his land

*By marl (and a light dressing) alone. There is by no means such a growth as to excite admiration, except upon the ground of the previous poverty of the land. Ed.

(then fresh) beyond the power of reclaiming, and that he had to look for other land. Now, sir, look on this, and look on that, and see how things will be at a future day. Success to you and your Register. I approve James Barbour's plan, of an agricultural convention.

JOHN THOMPSON KILBY.

RELATION OF PLANTS TO SOILS OF CERTAIN INGREDIENTS.

To the Editor of the Farmers' Register.

Newbern, (N. C.,) Oct. 8th, 1835.

I have just read with much interest your "Inquiry into the causes of the formation of Prairies," &c., contained in the number of the Farmers' Register for the present month. At page 328 of the number, you give the names of certain plants mentioned by Dr. Clarke as growing on the *steppes* of Russia, and you desire to be informed "whether these plants are confined to calcareous soils or not."

To this inquiry it is not in my power, at present, to give a satisfactory answer, having within reach but few works at all relating to the subject. The following statements are all that I can at present furnish, bearing on the question.

The plants mentioned in your notes, are the following:—*Centaurea frigida, Centaurea radiata, Crocus sativus, Geranium sylvaticum, Silene quadrifida, Sisybrium loeselii, Statice trigona, Stipa pennata.*

The United States, east of the Alleganies, afford not a single native species of *Centaurea.* The only species yet found in North America, was discovered by Mr. Nuttall in *Arkansas,* (I think) on whose *prairies* he reaped a rich botanical harvest about the year 1832, (I do not remember the exact date.) The species has been named *Centaurea Americana.* I cannot say that it was found on calcareous soil, or even in a prairie, not having seen any published account of it; but the probability is in favor of such a supposition. The genus *Centaurea* is nearly allied to the genus *(Carduus* or *Cnicus)* which is described as growing so luxuriantly on the *Pampas* of South America; and from my own observations, I think that this genus delights in a calcareous soil.

There is no native *Crocus* in North America, and I am unable to say what is its natural soil.

Of the genus *statice,* our two native species (*statice* armeria and *statice* caroliniana) grew in *saline* soils on the sea coast. This numerous genus is principally indigenous to the *sea coast* of the south of Europe. Probably excess of saline matter in the soil may be as hurtful to vegetation as excess of calcareous matter, and may be the cause of some of the denudated plains of Russia and Tartary, and also of some towards the south sources of the Arkansas and the Red River.

The most vigorous native *Silene* that I have seen, grew on a highly calcareous soil. Of the particular species mentioned, I know nothing.

The genus *Stipa* is by no means abundant in the Southern Atlantic States; but in "Upper Louisiana," according to Mr. Nuttall, (Genera, Vol. I. page 59,) "they appear in many places the prevailing herbage, communicating to the desert plains in autumn the coloring of harvest, called *payjonal* by the American Spaniards."

H. B. C.

[The testimony afforded above, so far as it goes, accords well with the positions taken in the essay referred to by our correspondent. The exception as to saline soils, had been there noticed, and given its due weight. It is to be lamented that botanists have heretofore paid so little attention to the chemical nature of the soils to which particular plants were limited. If they had suspected the uniform connexion, which we believe to subsist between certain plants and soils of a certain constitution, their researches would have been made more easy, and far more successful. There is so little of calcareous soil in the Atlantic slope of the United States, that if it is known that any plant is never found there, and is abundant in the west, and in Europe, there is strong presumption that the plant requires, and indicates a calcareous soil. In like manner, a knowledge of the constitution of the soil would of itself show that certain plants could not be found, however suitable the climate.]

CONSTITUENT PARTS OF DIFFERENT VEGETABLE SUBSTANCES.

[When taking an extract from the table of Saussure for the note at page 388 of this No. we remembered having seen this more minute and accurate statement in the *Traité de Chimie,* and wrote to our friend Prof. Rogers, who owns the copy of that work, for a copy of the table, which we are now enabled to insert, though out of the place for which it was designed.]

University of Virginia,
Oct. 18, 1835.

DEAR SIR—Your letter would have been promptly answered had it been in my power to procure Berzelius. The arrival of my books, delayed by accident on the river, has at length enabled me to attend to your request, and I take pleasure in sending herewith a copy of the table of the composition of the ashes of various kinds of wood, &c. translated and transcribed from the sixth volume of the *Traité de Chimie* of Berzelius.

These analyses were made by Berthier, one of the most skilful chemists living. Among the points of interest presented by these results, I would call your attention to the fact of *soda* being present in every case, as well as potash, though in most of the experiments, the two alkalies were only determined in the *aggregate.* In the instance of the Norwegian fir, where they were separately ascertained, the amount of soda greatly *exceeds* that of potash, a fact which Berzelius explains by referring to one of the striking geological features of the mountains of Norway. These are in many cases composed chiefly of Basalt, which contains soda in various forms of combination, and which is more readily converted into soil by the action of the weather, than the granite rocks of the country containing potash.

Your friend,

WM. B. ROGERS.

NAME OF SUBSTANCE BURNED.	Ashes in 100 parts of substance.	100 parts of ashes contain		100 parts of the matter soluble in water contain							100 parts of the matter insoluble in water contain								Computed amount of phosphates.	
		Matters *soluble* in water.	Matters *insoluble* in water.	Carbonic acid.	Sulphuric acid.	Muriatic acid.	Silicic Acid (Silex.)	Potash. / Soda.	Water.		Carbonic acid.	Phosphoric acid.	Silicic acid (Silex.)	Lime.	Magnesia.	Oxide of Iron.	Oxide of Manganese.	Carbon.	Phosphate of Lime.	Phosphate of Iron.
Charcoal of Oak, - - -	0.030	0.155	0.845	22.4	7.5	5.2	1.0	64.1			32.6	5.7	5.8	42.6	7.0	1.5	4.5		7.1	3.7
Wood of Oak, - - -	0.025	0.120	0.880	24.0	8.1	0.1	0.2	67.6			39.6	0.8	3.8	54.8	6.0				1.8	
Bark of Oak, - - -	0.060	0.050	0.950	23.2	6.0	0.7	0.	69.3			38.5		1.1	50.1		0.8	7.4	2.1		
Wood of Linden, - - -	0.050	0.108	0.892	27.42	7.53	1.80	1.61	60.64			39.8	2.8	2.0	51.8	2.2	0.1	0.6		5.4	2.5
Wood of Birch, - - -	0.010	0.160	0.840	17.0	2.3	0.2	1.0	79.5			31.0	4.3	5.5	52.2	3.0	0.5	3.5		7.3	1.25
Charcoal of Alder, - - -		0.188	0.812		6.6	0.3					31.0	7.7	5.0	50.2	2.5	3.6			3.45	9.00
Wood of Fir (*Pinus Abies,*) -	0.0083	0.500	0.500	13.5	6.9	0.0	2.0	28.2 41.5		7.9	21.5	1.8	13.0	27.2	8.7	22.3	5.5			3.00
Charcoal of Do. - -		0.257	0.743	30.2	3.1	0.3	1.0	65.4			23.0	4.2	8.0	39.8	4.4	14.1	6.0			6.3
Charcoal of Pine (*Pynus Sylvestris,*)	0.0124	0.136	0.864	20.75	12.	6.6	1.33	31.66.15.33			36.0	1,0	4.6	42.3	10.5	0.1	0.4	4.8	1.72	0.25
Wheat Bran, - - -	0.044	0.190	0.810	Trace	0.2	13.0	35.0	50				1.2	75.0	5.8		2.5		15.5		

The spaces are left vacant whenever the number appropriate to them has not been determined.

From the Petersburg Intelligencer.

COMMERCIAL.

We are indebted to a friend for the annexed statements of the export of staple articles of produce from Virginia for the year ending 30th ultimo.

EXPORT OF TOBACCO, STEMS, COTTON AND FLOUR, FROM VIRGINIA TO FOREIGN PORTS, FOR THE YEAR ENDING THE 30th OF SEPTEMBER, 1835.

	London.	Liverpool.	Bristol.	New Castle.	Glasgow.	Leith.	Cowes, &c.	Havre.	Bordeaux.	Marseilles	Bremen.	Rotterdam.	Amsterdam.	Antwerp.	Gibraltar.	West Indies.	Rio and a market.	Total.
TOBACCO,	6878	6918	1290	192	671	283	2943	3661	300	150	1077	758	30	400	250	16	2	25,819 hhds.
COTTON,	81	15006	–	–	2823	–	100	1220	257	–	359	101	–	50	–	–	–	19,897 bales
FLOUR,	10	2000	–	–	–	–	–	360	–	–	–	–	–	–	–	6282	62089	70,741 bbls.
STEMS,	–	–	–	–	–	–	154	–	–	–	909	288	282	502	–	–	–	2,135 hhds.

Exported from Virginia.

	Tobacco. Hhds.	Cotton. Bales.	Stems. Hhds.
In 1831	23,832	20,639	2,984
1832	27,056	31,950	5,556
1833	20,754	20,144	2,395
1834	25,408	31,045	2,170

Tobacco inspected in Virginia.

	Passed. Hhds.	Refused. Hhds.	Stock. 1st Oct.
In 1831	28,338	18,239	15,572
1832	21,753	15,846	11,950
1833	20,655	13,621	12,346
1834	20,640	14,857	11,591
1835	27,509	19,991	15,626

Statement of cotton for Virginia.

Stock on hand 1st October, 1834		450 bales.
Received up to 1st October, 1835		33,350
		33,800
Exported to foreign ports during the 12 months ending 30th ult.	19,897	
Exported coastwise for same period	8,000	
Manufactured in Virginia	5,400	
		33,297
Stock on hand 1st October, 1835		503 bales.

IMPROVEMENT OF WORN LAND BY CLOVER AND PLASTER.

To the Editor of the Farmers' Register.

Orange, Sept. 24, 1835.

As I think it the duty of every subscriber to your valuable journal to give some account of his method of farming, or improving his land, I will commence by giving you an account of the improvement of a piece of worn out land, which I purchased a few years ago, which at the time I got possession, would not bring more than one barrel of corn to the acre. I commenced by clearing up the land, and ditching where it was necessary, and making dams or stops across the gulleys, and then throwing into them all the brush, and a little wheat straw, or something to stop the dams, and retain the earth that would be otherwise carried off. I then ploughed the land deep, and seeded it in the month of March with oats and clover seed—and as soon as the seed came up, I plastered it with half a bushel of plaster, and the same quantity of ashes per acre. The crop of oats was a small one. The plaster and ashes were repeated the next spring upon the clover, and there was a fine growth. Great care was taken to have as little of this green crop destroyed as possible, allowing only a few beeves and calves to graze after the clover was in the head. A fine crop of clover was turned under the last of August, and the land seeded in wheat in October. The crop was between nine and ten bushels per acre. The next spring the land was plastered again in the same manner, and there was a fine growth of clover, which was very slightly grazed in the fall. The

land was ploughed with three horses in the fall and winter, turning under a great quantity of vegetable matter, almost in a dry state. The land remained in that state until spring, when it was planted in corn—and although we had a drought, it produced five barrels of corn to the acre, and the land is nearly restored.

I will now give you some account of my system of farming,or rotation of crops, as I think my land has improved very fast under this course. It is to divide the farm into three fields, and several grass lots: say, for example, each field to contain 120 acres—80 acres to be in corn, and 40 acres of the poorest to be in clover, and fallowed for wheat—the next year the whole field, say 120 acres, in wheat—the third year in clover, which will complete the rotation. Or thus:

	FIRST FIELD.		SECOND FIELD.		THIRD FIELD.	
1st year,	80 acres in corn,	40 in clover,	80 in wheat after clover,	40 in wheat after clover,	80 in clover after wheat,	40 in clover after wheat.
2nd year,	80 in wheat after corn,	40 in wheat after clover,	Clover after wheat,	Clover,	80 in corn after clover,	Clover to fallow.
3rd year,	80 in clover,	40 in clover,	Corn after clover,	Clover for fallow,	Wheat after corn,	Wheat after fallow.

When the rotation commences again, that part of the field which remained in clover and was fallowed, will now be the best*—and should be in corn with 40 acres of the next best, leaving 40 acres of the poorest in clover to be fallowed again for wheat. The clover should always be plastered, and a proportion of ashes mixed with the plaster, and should only be partially grazed, leaving at least two-thirds of the clover to improve the land. To prevent grazing, I have besides my meadows, some clover lots, which as soon as the grass is sufficiently tall, is cut night and morning, and carted to the farm-yard to the cattle which are driven up from the woodland, where they browse on the buds through the day. They also have plenty of dry food, such as wheat straw and corn stalks, which are always put up securely when my corn is gathered. I also use every exertion to make as much manure as I can from wheat straw, corn stalks, &c. &c., the coarser parts of which I top dress my wheat and clover with. Indeed, I think to cover your young clover with the long manure, or wheat straw, is the most judicious method of using it, as it secures (with the use of plaster) a fine crop of clover, and I think a heavy crop of clover turned under in a green or dry state equal to any manure, (particularly of a dry season.) I have never failed in a crop of corn on a clover lay, especially if I can turn under the clover in the fall and winter, which I think important, as the cut worm is not so bad as they would be if the land was ploughed in the spring, and the clover would be in a state of decomposition, which would cause the corn to grow off very fast.

CATLETT CONWAY.

For the Farmers' Register.

COVERING CORN WITH THE HARROW.

Last spring, when the time for planting corn arrived, my land was very rough and much additional preparation was wanting. The ploughing, though generally deep enough, had not been either regularly or well executed, and the growth of clover and weeds had not been well covered. The extreme cold and wetness of the season had made much of the ploughing for corn late in the winter—and on the part broken early (and especially where badly ploughed,) the spear grasses were shooting up in spots. Under similar circumstances formerly, I have given a complete second ploughing before planting: but besides the great labor, this tears up the buried grass, and leaves the surface very rough. But besides this objection, this process was then out of the question, as owing to the measles then passing through nearly all my family of negroes, there was not more than half the proper force for work. I had long before tried covering seed corn, on well prepared land, with light harrows. But though the seed vegetated well enough, the plan had been abandoned on account of the surface being left too smooth, and thereby made more liable to be "baked" by heavy rains. The bad state of the land, and the want of hands to cover the seed with hoes, induced me to try large heavy square harrows, with straight teeth, such as were used to get in wheat on fallow land—each being a full draught for a pair of horses, and was generally drawn by four oxen. The corn rows were marked off, as usual, by a small trowel plough, the seeds dropped, and the land then harrowed flush, and thoroughly, as if the only object had been to put in order a rough and foul fallow. The process was the cheapest as well as the most effectual for getting the surface of the ground in decent condition, and the corn was as well covered, to insure its vegetation, as would have been by the usual slow and more costly method of covering seed. The harrow teeth cut deep, and not very close together, so that the surface was not merely scratched and smoothed, (as by light harrows,) and therefore the danger of "baking" was not incurred. This danger, however, would perhaps have been sufficiently removed by the layer of vegetable matter ploughed under.

Those who have never tried covering corn by the harrow, may suppose that the seeds would often be displaced. This evil could not have been incurred by me, as my corn (though planted on a flat surface) was designed to be ploughed only in one direction, and the harrows were drawn in the direction of the rows. But I do not believe that any notable disadvantage of this kind would be found under any circumstances. I always covered cotton seed with harrows, as the cheapest and

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*Query—Is this great improvement of the poorest 40 acres known from experience, or is it a result expected, and resting only on opinion? If the former is meant, the fact is too important to have been left in doubt. Ed.

best method, without finding any evil of this kind —and certainly cotton seed would be more apt to be moved along by the straight tooth of a harrow, than corn. My opportunity did not permit me to estimate the saving of labor gained by this process—but there is no doubt of its having been very considerable, if the plan is considered merely as a substitute for covering the seed, besides all the benefit gained in putting the land in good condition for the growth, and after tillage, of the crop.

E. R.

For the Farmers' Register.

TO LESSEN THE COST OF RE-PLANTING CORN. REMEDIES FOR THE CUT WORM.

The re-planting in our corn fields, made necessary by the depredations of vermin of various kinds, and especially by the cut worm, is a serious evil to almost every farmer. The cut worm is most destructive on clover lands, or others not grazed, and particularly when the breaking up of the land for the crop of corn has been delayed until the latter part of the winter, or beginning of spring. Though I have rarely been a sufferer on account of late planting, it happened so this year. Owing to the excessive cold and wet winter, a part of my field could not be ploughed until late—and much the greater part of the first planting failed to stand. Without such uncommon cause of destruction, it may be safely counted on that the labor of re-planting and the transplanting of corn, on all farms not grazed, is not less than that of the first general planting—and the loss of crop, owing to the lateness of the products of such plantings, is of more amount than the cost of the labor.

The preparing of seed corn with tar, oil, sulphur and lime, as described page 22, Vol. I. Farmers' Register, should never be neglected, as a defence of greater or less value, against animals which devour the seeds. But heretofore no sufficient remedy has been made known, for the after destroyers of the young plants, among which the cut worm stands most prominent. Many remedies have been published—but early ploughing, (which cannot be effected in all seasons,) seems the only one of much value, and even that is but a partial defence. The various other remedies have either been too costly (even if effectual) or opposed to the improvement of the land, as is the case with the plan of burning off the vegetable matter.

A friend of mine who is a farmer of enlightened views and accurate observation, in Dinwiddie, lately informed me of his having this year made trial of putting drawn ashes mixed with gypsum to each hill or station of corn, according to the manner described at page 700, Vol. II. Farmers' Register. The crop appeared to him to be much improved by the application—though it falls *very far* short of the results which have been reported of a similar practice in Maryland. But what struck him more forcibly than the increased growth of crop, was that the corn so treated, stood remarkably well, while the other and adjacent corn, suffered much by the ravages of cut worms. The precise manner in which this benefit was produced had not occurred to him—nor did it to my mind, until after seeing the following passage in the last Tennessee Farmer, which states similar results of the like process.

"We are assured by a gentleman of our acquaintance, that during the last spring, he tried the following method on two fields in which the ravages of the cut worm threatened a total destruction of the crop, and that in both instances it was attended with complete success. As the application of this remedy will certainly produce an increase of crop, amply sufficient to compensate for the labor and expense of applying it, whatever may be its effect in preventing the ravages of the cut worm, we earnestly recommend to every farmer and planter to give it a full and fair trial. That the gypsum or plaster is highly beneficial in promoting the growth of the corn, we know from repeated experiments, but we presume, that the efficacy of the application in preventing the ravages of the cut worm is to be attributed to the ashes—lime would probably be equally, if not more effectual, in accomplishing the same object. The remedy recommended is the following:

"As soon as the corn is covered with earth, let a hand follow, having a bag hanging at his side, containing ashes and plaster mixed, one-third of the latter, and two-thirds of the former, or ashes alone, either leached or unleached—the latter would probably be preferable—and let him drop a handful on each hill of corn. We would recommend, where it can be obtained, the partial substitution of lime for ashes, in which case, to preserve the hands of the dropper from injury, it will be necessary for him to use a cup, shell, or gourd, with which to take up the lime—each bag should be large enough to contain as much of the substance used as the dropper can conveniently carry." ——"In our use of ashes and plaster, they were dropped on the seed corn and covered with it. The effect on the crop was decidedly and greatly beneficial. For preventing the ravages of the cut worm, there is good reason to believe, that it would be best to deposite the ashes on the hill after the corn is covered, and this mode will probably be found, nearly, if not quite as beneficial in increasing the crop."

It appears to me that the suggestion of substituting quicklime is well worthy of attention. A very small quantity of this substance, not making a tenth of the compound, would suffice—and a larger addition might be hurtful to the young plants. The lime, however, in the compounds used, was *mild*, and therefore not destructive of insects by its retaining a caustic or burning quality. Perhaps a still smaller quantity of salt, would also be serviceable. Both quicklime and salt are known to be destructive to many insects, and would aid the object in view, of keeping the cut worms away from the plants until out of danger. The Horticultural Register says that "fine salt sown immediately after seeds are put into the ground, at the rate of two bushels to the acre, will destroy grub worms." If so small a quantity of salt, sown broad-cast, could have such effect, (which may well be doubted,) as much benefit might be expected from the preventive action of a few grains' weight of salt applied close around the seeds. Even if the application of the mixture had no effect as manure, but served effectually to guard against this one enemy, the cost would be well remunerated. But there can be but little doubt of causing besides enough increase of fertility, to make the application profitable on that score.

It may be deemed rather hasty in me to recommend practices which I have not yet tried. But my object is to induce others to make full trial next spring, as I propose to do, with the plaster and ashes in the proportions above stated —with ashes containing all their salts, or deprived

of them by dripping or exposure—with the addition of quicklime, and of salt, separately and combined. Sufficient experiments I hope will be made, and the results made known through the Farmers' Register.

Having referred to the experiment of my friend made with ashes and plaster, for the effect in securing a better "stand" of the crop, it is proper to add some other particulars. The ashes were from old heaps lying about negroes' houses, long exposed to the weather. The gypsum did not exceed one-twentieth of the mixture, and seemed to have no effect, as no difference could be perceived between the effects of the mixture, and of ashes alone, the increase from both being judged by the eye to be less than 10 bushels to the acre, or 50 per cent. more than the land not so treated. The ashes (or the mixture) were used to cover the grain after dropping it, and in quantity as much as a large double handful at each place. This would probably have been too much, if the season had been dry—for the manured corn showed some tendency to "firing," in the intervals between rains, though it proceeded to no injurious extent.

E. R.

PROPOSED RAIL ROAD EROM LYNCHBURG TO ABINGDON.

[The following copy of a petition is circulating through the newspapers, without any mark of its origin or authority. But we give it a place here because it is believed to express the views of the people of Lynchburg, and of a large adjacent region, and which will be pressed by them on the Legislature of Virginia at the approaching session.]

To the General Assembly of the Commonwealth of Virginia.

"The petition of the undersigned citizens of the . of most respectfully represents:

"That authority has been granted to establish a rail road between the cities of New Orleans and Nashville, by the legislature of Louisiana, with the consent of those states whose territory will be traversed by such road. Engineers have been actively engaged in surveying the proposed route, and have progressed so far as to justify the offering of proposals for contracts for constructing fifty miles of the road. When this work shall have been completed, five hundred aud thirty-eight miles of the distance between the town of Lynchburg, on James River, and the city of New Orleans, will remain, and on which, when a similar road shall have been made, there will be a continued line of rail road from the waters of the James River to those of the Mississippi.

"A considerable part of this distance lies within the borders of Virginia, and your petitioners respectfully pray the General Assembly of Virginia, to incorporate a company for the purpose of constructing a rail road from the town of Lynchburg, by Buford's Gap in the Blue Ridge of Mountains, to some point on the Tennessee line, with the purpose of uniting the same with such rail road as the Legislature of Tennessee, may direct, or authorise to be formed from Nashville to the Virginia line. Your petitioners further pray, that the privilege be granted to such incorporated company, or to the James River and Kanawha Company, of extending a similar road from Lynchburg to the city of Richmond, so as to intersect and be connected with the Richmond and Fredericksburg Rail Road.

"The great and obvious advantages which flow from the undertaking in question, and its execution as promptly as the resources of the country will justify, are generally acknowledged. By it a continuous line of rail road will be at no remote period made from the city of New Orleans to the city of Boston, passing through the heart of this Commonwealth, near to her finest river and greatest public work, and her capital. The numerous passengers which such a rapid and convenient mode of transportation will necessarily tempt within the limits of the state, must bring with them great benefits. Such a thoroughfare, uninterrupted as it must be by any competing route, will introduce much wealth on its borders. To the company, and the community, it will be found a most profitable investment. The tract of country through which the proposed road will pass, is one of the most fertile in soil, and abundant in mineral products within the United States, and possessing the inestimable advantage of being blessed with a climate of great salubrity. The contemplated road will open an easy communication from the interior of a vast, rich and populous country, to cities convenient to navigation, and where the trade may seek transportation by sea vessels, while it will enhance the value of the productions of the farmers, and contribute to the rapid growth of the cities. It will serve to give a sure and rapid means of conveyance to travellers, and the mails, to and from the most distant parts of the republic, and will contribute largely to the increase of the profits of the James River and Kanawha Company, by drawing thereto the transportation of domestic produce and foreign goods of much bulk, between the town of Lynchburg and the city of Richmond. Believing that these obvious and numerous benefits to the state, from the formation of such a road as that proposed by your petitioners, will be generally acknowledged, they forbear a minute enumeration of others, and content themselves with the expression of the confident opinion, that funds adequate to this great object can readily be obtained, and with praying that the general assembly will pass an act to incorporate a company for the purpose aforesaid, and to authorise books, under the superintendence of suitable commissioners, to be opened at such places as may seem proper, for receiving subscriptions in such company; and they will ever pray, &c."

From the Fredericksburg Arena.

CHESAPEAKE AND OHIO CANAL.

We have recently had an opportunity of inspecting the Chesapeake and Ohio canal, from Georgetown to Harper's Ferry, and take the earliest opportunity of expressing the admiration which a sight of that magnificent improvement necessarily inspires. It is unique. There is no canal in this country—nor, we believe, in Europe—of any thing like the length, which approaches it in dimensions. In comparison, the Hudson and Erie canal is a mill race. Nor is admiration confined to its vast dimensions:—the difficulties surmounted; the rugged country through which it passes; the solid and beautiful masonry of the locks and

acqueducts; all conspire to impress upon the traveller a high sense of the engineers and of the enterprise of the company, which has persevered in the work, under so many appalling difficulties.

We left Georgetown, about half past 6 A. M. in the tri-weekly packet boat, drawn by two, and sometimes three horses. The boat was built by the canal company, and only temporarily used by the packet company, and was far too large for the business. We were carried along, nevertheless, at the rate of 6 miles per hour—a rate which was reduced, however, on the average, by the stoppage occasioned by two and thirty locks in 62 miles. The packet company has, by this time, two smaller and better constructed boats afloat, by which a daily line will be kept up. We have alluded to the locks and acqueducts. We cannot specify as to the former: for all seemed equally neat and substantial, and built—as is indeed the whole work—for posterity. The acqueducts over Seneca and Monocacy creeks are perhaps not exceeded by any thing in the country, for beauty and lightness of design and solidity of construction. The wilderness of the scenery around setts off to greater advantage the triumphs of art over nature.

It is, however, from the Point of Rocks to Harper's Ferry—12 miles—the greatest difficulties have been encountered. For this distance the Baltimore and Ohio Rail Road runs parallel to, and in contact with the canal—the bank of the latter forming the bed of the former. Both works are carried, for miles, under precipitous crags, impending many hundred feet above you, and whose very foundations have been cut away to form a shell for the road, while the canal is made to encroach on the bed of the river. The scenery itself is grand and imposing, and when viewed in connection with the monuments of human genius and perseverance which are seen at the base of the cliffs, it assumes the character of sublimity. He must indeed have a dull spirit, who carried along by boat or car, can view it unmoved. We have rarely experienced feelings akin to those we felt, on a fine morning, seated on the top of the car, and whirled along at the rate of 10 miles per hour along side, and under these tremendous precipices. We could, for miles, have touched with the hand the walls of everlasting granite, and not seldom was the perpendicular view of the sky actually obscured by the jutting out of the crag. This is a part of the rail road, on which the use of steam is prohibited by stipulation with the canal company.

The canal is finished as high up as Williamsport, about 104 miles from Georgetown, and is now under contract from the former point to Cumberland. In another year and a half the coal of the Alleghany will find a market in the eastern cities.

The rail road—that is the Baltimore and Ohio Road—terminates at the Ferry. On the other side commences the Potomac and Winchester Road, now nearly finished. The works are to be united by a viaduct, built at the expense of the former company. Baltimore will thus have, in a few weeks, a direct communication with one of the most populous, fertile, and wealthy sections of our state.

ADVICE WANTED, AND COMMENTS THEREON.

——— *County, Va.*, ——— 1835.

Dear Sir:

As I am a stranger to you, and not a subscriber to the Register, the following information is requested with becoming diffidence: though I am emboldened to do so from a belief that you are desirous of imparting to every one the best information touching the agricultural interest. Therefore, without further comment, I will first state that I am the owner of a farm on the banks of the ——— river immediately below the mouth of ——— creek. The banks of the river, on my land, as well as the ravines, abound in shell marl, the quality of which, I am induced to believe, is of the best kind. There are also strong reasons to conclude that the green sand marl, (such as is described in the Register, May No.) exist in strata among it. Now I am desirous of commencing to improve (immediately) by means of this marl, and must request the favor of an answer, directing in as few words as possible, the most approved mode of its application—the time when—the quantity, &c., &c. to be applied. I do not expect you to be exact, but that you give me the best idea by general remark.

Having understood that you are supplied with a chemical apparatus, and are in the habit of analyzing all calcareous substances, [I have] the thought of putting up portions of the different kinds of marl on my land, as also portions of the different kinds of earth, and while in Richmond this winter, to pay you a visit for the purpose of getting further information, that I may prosecute the contemplated improvement upon scientific principles, when I shall become a subscriber to your invaluable Register. For the above requested information I shall be your obliged and obedient servant,

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N. B. I hope (under the circumstances) you will excuse the liberty I have taken.

[The foregoing letter is an amusing example of the frequent and heavy demands made on our time and labor, for objects of very small importance to the applicants, and of none whatever to any other person. This, it is true, presents an unusually strong case: but there are other persons, who though also total strangers, and not even subscribers, have made applications of very similar character, as if they thought that we had nothing else to do, and no greater pleasure to seek, than to comply with their wishes, and answer their inquiries, severally and specially. After suppressing merely the names which would identify the writer, we have taken the liberty to publish this letter, and will use the occasion to answer all similar applications—and some of which have been pressed more than once on our attention.

If we were to answer the demands (present and threatened hereafter) of the unknown gentleman who wrote the above letter, it might occupy more than a week of our time and labor, and then would furnish a very meager and unsatisfactory body of instruction—and of far less value in every respect than the result of our labors of this kind already laid before the public, and which Mr. ——— might have bought if he had chosen, for 50 cents. We can have no motive for

incurring so much trouble to comply with these demands, present or to come, except the distant prospect held out above, that after all the service has been performed, the writer may *possibly* subscribe for the Farmers' Register—and that inducement even if multiplied twenty-fold, is not sufficient to engage the services required, with such "becoming diffidence."

When the eccentric Dr. Abernethy was waited on and consulted by persons suffering under disorders of the stomach, on which he had published a treatise, he would often for his guinea fee return a shilling, with only the advice, "Take this and buy my book, and you will find in it all that I can tell you." If we may be excused for copying the manner of this great man, we would reply (but without a prescription fee) in the same words, to those who ask such advice as the above.]

TUNICATA CORN.

To the Editor of the Farmers' Register.

Columbia, (S. C.,) Sept. 26th, 1835.

* * * I send you a few grains of a curious kind of corn. It may not be a stranger to you; for I have known it for three or four years, and though strange, it is not, that I know of, of any particular advantage to the cultivator of it. It is possible that its particular utility may yet be found out. The few grains enclosed in this letter were taken from one of the common ears, which, when looked upon with the shuck on, appear exactly like any other kind of common corn; but, as you see, each grain is, besides the external shuck that envelopes the whole ear, wrapped up each in a shuck to itself; and so is the case with every grain of the ear. It must be a very precious grain, that Dame Nature takes such special care in protecting it. The ears are of the usual size and appearance. This corn has, however, another peculiarity, which is, that almost every tassel is also furnished with grain. I send you, about the 10th or 15th part of one of the tassels, or small blossoms with the grains on. You will observe that the grains of the tassels are all round. I intend to plant a few grains of it to see what it will come to, and if it will produce the same kind of corn as the grain from the ears. I should like very much to have an opportunity of sending you a full ear and a full tassel of it.

N. HERBEMONT.

[This corn (though larger) is of the kind described at page 75, Vol. II., as the Tunicata, a product of Paraguay, and supposed to be the original kind, from which all the numerous varieties of corn have proceeded. Each branch of the tassel of this, as appears from the portion sent by Mr. Herbemont, approaches somewhat in form to a head of wheat or rye, many of the receptacles for the fecundating farina enclosing perfect grains.]

FACTS WANTING.

We take the liberty of reminding all of the many practical farmers who have heretofore contributed to our pages, (and would be glad if our wishes could operate on the far greater number who have *not* given any such aid—) that the Farmers' Register has latterly exhibited a deficiency of practical matter, or of facts, the result of observation or experiment—and we earnestly request that such deficiency may not be permitted long to remain. It is not that we undervalue pieces of general reasoning and speculation, or that we are not thankful for all contributions of that character. But if a comparison is to be made of the respective amounts of value, as operating on the community, there is no doubt of the superior influence and effect of statements of facts. The preference for such matter, with very many, unfortunately extends much too far—so far indeed, that *false facts* are permitted to have more weight than the most correct abstract or theoretical reasoning. Without justifying this degree of preference—or yielding our own preference for reasoning unsupported by facts, to apparent facts unsupported by reasoning—we repeat to our correspondents that their statements of useful practical results, however concise and (taken separately) however trivial, will be more generally and attentively read, and will therefore have more beneficial effect, than perhaps any thing else that could be communicated. Hundreds of such useful facts have probably been observed and noted, even during the growth of the last crops—and hundreds of our readers could at once furnish still earlier observations of useful facts, which now remain on their memorandum books, or merely in their memory, useless to all but themselves. We hope that the next No. will show a more general disposition to draw on these resources—and that no new fact will be deemed too trifling to be communicated, if it was of any value to its observer, and is not generally known to others.

SEASON AND CROPS.

The commencement of cold weather, accompanied by killing frosts, was unusually early. Much growing tobacco has been injured or destroyed. The middle and latter parts of October were warm, while its early part and the last days of September were uncommonly cold. The season and state of the earth have been very favorable for putting in the seed wheat in good order and in good time—and the very early frosts may be considered as some security (if any can be at all relied on,) against the attacks of the Hessian Fly. No seed had suffered from weevil—and so far, every thing has favored the preparation for the next crop of wheat.

The crop of corn, notwithstanding the unusual luxuriance of growth, will (as we foretold in our remarks two months ago,) fall far short of the general expectation. At least, such is the report of crops in our neighborhood—and the effect may be inferred to be as general and uniform as was the cause, viz: the unusually moist weather of the summer. The price of corn (old) still keeps as high as $4.50 the barrel in the Richmond market—though some crops of new, near Williamsburg, (belonging to persons about to move out of the state,) have been engaged by purchasers at $2. Wheat has kept for the last month above $1.25—more of ten $1.30—and both red and white wheats, in the Richmond prices current of October 27th, are stated as high as $1.35. These are the best proofs of the very short crop, and of the delusive character of the many statements to the contrary which appeared in the newspapers.